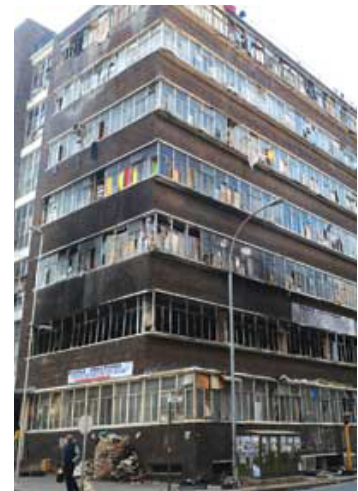


## RESOURCEFUL URBANISM: REVISIONS OF TYPOLOGY

A NETWORK OF RESOURCE 'ADD-ONS' FOR A POPULATION OF 400 000 IN DOWNTOWN JOHANNESBURG

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## LEXICON AND SYMBOLS



adding



subtracting

Grey: existing

Black: new

Red: demolished

Revision: a revised edition or form of something

Taxonomy: classification of elements

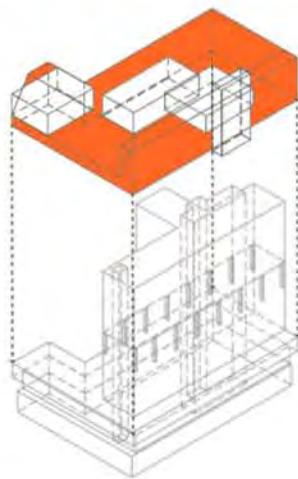
Typology: relationship between elements

Resourceful: any feature that provides comfort, convenience, or pleasure

Tactics: any mode of procedure for gaining advantage

Amenity: the sum total of ways of living

Carry capacity: the maximum population size that can be sustained



## INTRODUCTION

This dissertation emerged from a fascination with the current changing urban condition of downtown Johannesburg from a purely corporate work environment to a setting for living in and how the existing, decayed building stock has been reused and transformed accordingly by its 400 000 new residents.

This 90% increase in population density and occupancy rates has to function in under-serviced buildings and an under-resourced public environment that has to support life in a city that was not designed to be lived in 60 years ago. In this sense, the development of the city has exceeded that of the architecture, however its new residents are viewed as making the city productive again by offering resourceful ways of 'making do' in this urban environment. This dissertation attempts to understand the potential that the relationship between scales of city uses and building typology has for meeting the new demands and making the productive again.

While the existing high-rise building stock offers value that removes it from being demolished and rebuilt, it also offers an existing capacity through a space economy characterised by generic, flexible floor area that can be utilised for multiple uses. It does, however, need to be increased and serviced to meet the new growing demand for space. This dissertation is therefore a speculation on a different type of architectural intervention that can transform the existing 1960's modernist office typology into a self-sufficient urban resource by tactically 'bulking up' the existing podium level to expand its carry capacity, inserting resource programmes and creating a city-wide resource network that can support its residents and contribute back to the city by regenerating it from the bottom up. Through this effort it sets up a different type of urbanism where life unfolds around these 'add-ons' to create a resourceful urbanism.

This dissertation attempts to cover, as a narrative, the process of unpacking ideas that informed the existing modernist typology to redefining what it means to live in proximity to these resource 'add-ons'.





Figure

## STRUCTURE

In so doing, the ideas and explorations are structured according to the before and after condition of downtown Johannesburg, where the relationship between the changing urban environment and the relevant building typology converges to form a narrative for the process of uncovering and exploring a typological , across time, as the year has progressed.

As a general rule cities are analysed in space but in studied in time. This report therefore analyses downtown Johannesburg through a taxonomy of elements and typology, as the relationship between elements. In this way, the structure of the report produces a way in which to examine the city.

Urban before deals with fairly broad research aspects of the dissertation, specifically the development of the existing condition of downtown Johannesburg from mining town to its current condition and the associated building typologies that respond to the use of the city at that point in time.

Building typology before deconstructs the existing dominant high-modernist office typology through the use of a taxonomy and typology analyses in order to understand the relationship between form and function as well as assess its potential for radical reuse.

Urban(ism) now discusses downtown Johannesburg in its current state, analyses an existing portion of the city to understand the complex layers that inform its development. It also begins to explore a set of ideas in developing the notion of resourceful urbanism, the new relationship between city and building and a strategy to create a new network of resources.

Typological revising discusses the application of these ideas in a site specific design, and the process of unpacking these new 'add-on' resources as a network that supports the changing city. It does so through a taxonomy of its elements, existing and new, and a typology as the relationships between the elements across the urban and building scales. The ideas engage the pragmatic challenges of achieving this transition in building typology, from dealing with adding load to an ownership model.

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Figure

## BEFORE:

### URBAN

*The changing city: a mining town to a modernist city in decline*

From its earliest frontier days as a rapidly expanding boomtown at the epicentre of the thriving gold-mining industry through successive waves of downtown building booms, Johannesburg has experienced continuous change, driven by the imperatives to forge order out of the seeming chaos by imposing spatial stability and rational coherence on the urban form.

The philosophy that predicated the early layout of Johannesburg as a mining town - narrow streets, small erven and small 65mx65m city blocks - together with subsequent town planning regulations to curb the height of buildings, had acted as a brake on development.

In the early 1960's, however, the town planning regulations were finally changed to allow for taller buildings that could accommodate allowable bulk. The urban planners who designed the original cityscape of Johannesburg laid out the spatial grid of the city to facilitate mining, banking, industry, commerce, work, leisure and to efficiently administer the ordered use of urban space.

The need for this order and stability led municipal authorities to think in modernist terms of comprehensive planning for constructing the cityscape. This modernist impulse drove planners to impose a functional homogeneity through the demolition of the historic Victorian and Edwardian shop house building typology and instead introduce the high-modernist dreamscape of high-rise corporate office blocks, luxury shopping sites and entertainment venues that created an aesthetic monotony on the downtown urban landscape.

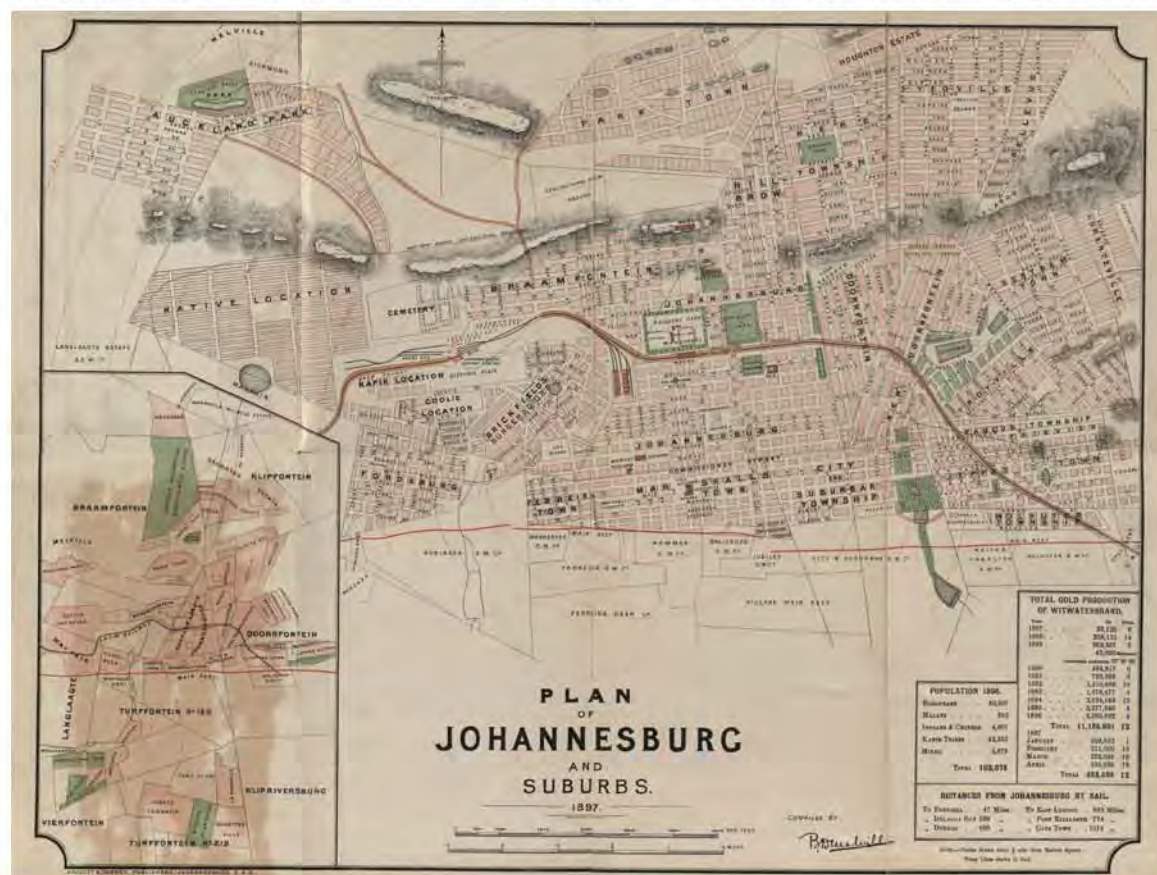
Land-use zoning, a modernist planning tool, was the driving force behind the modernising visions of functionally separate zones of mono-functional and racially homogenous places of work, residence, and leisure. This idealised segregated city would radiate outward from a central downtown core, connected and separated by efficient modes of transportation such as highways for private vehicles. In this case downtown Johannesburg was a place of work supported by adjacent places of residence that had been separated by a railway line in the north and highways on the south, east and west of the city.

This started a new building boom that included the construction of some sixty tower blocks in which the high-modernist city building produced a dense compression of new skyscrapers and a geometric expression of exploding size and verticality. So great was the





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Figure

building boom that by the mid-1960's the available office space of the 1950's had increased by one third.

However, towards the end of the 20th century post-industrial cities across the world experienced the phenomenon of urban decline. It began with the en masse abandonment of downtown industrial facilities and modernist office buildings as the buildings built during the earlier part of the 20th century were no longer able to meet the demands of a changing society. These businesses were seeking a new type of technology driven building- one that was more efficient when it came to environmentally friendly air-conditioning systems, faster lifts and state-of-the-art technology infrastructure.

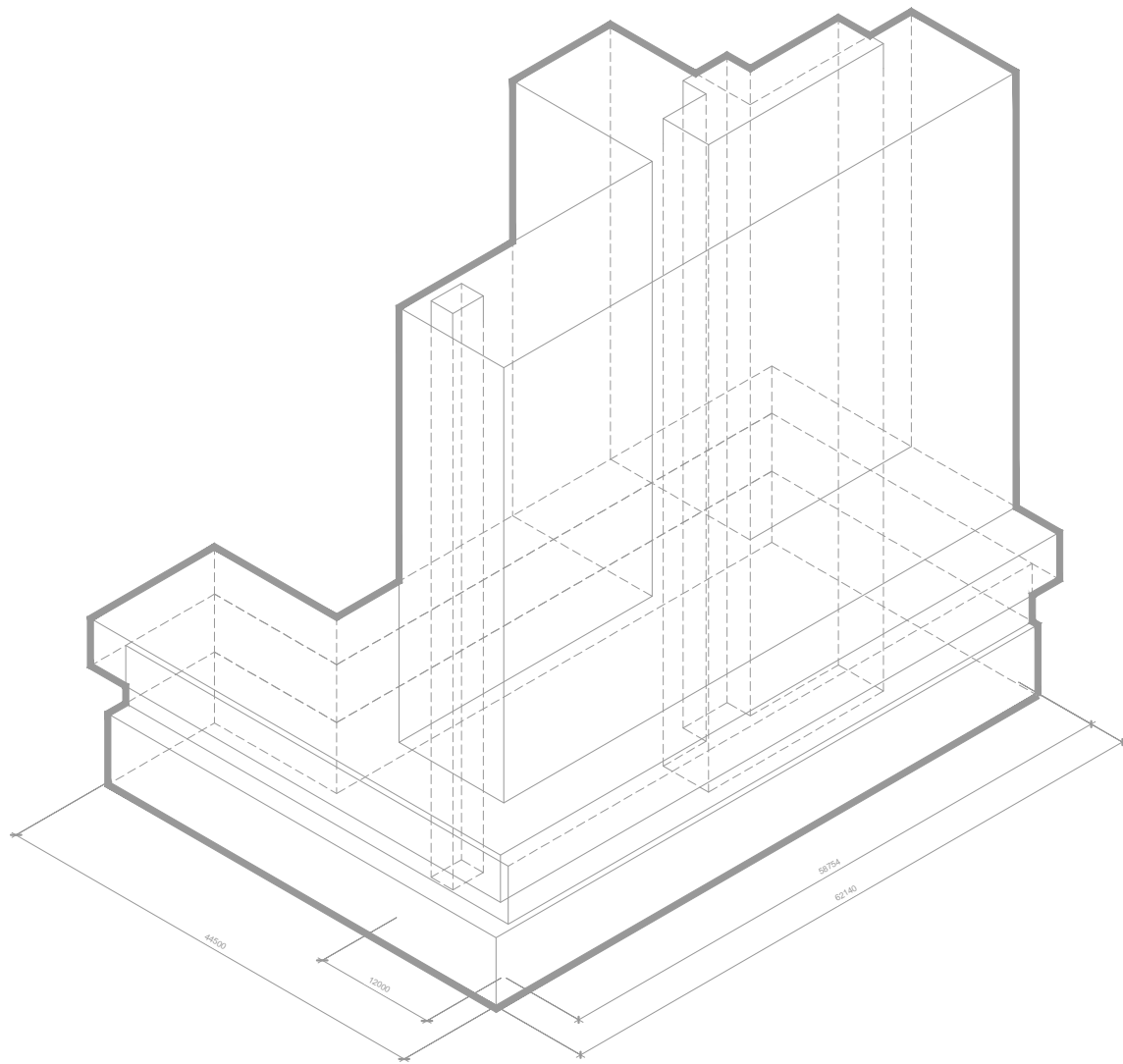
Downtown Johannesburg faced a similar scenario in that by the late 1980's change happened rapidly where the flight of white businesses and large retailers to the northern suburbs was already underway as developers preferred to build newer and smarter buildings on 'green fields' sites.

However, unlike other world cities that experienced downtown decline, Johannesburg's city centre was not abandoned in its entirety as the reasons for its downtown decline were not that straightforward. It was not just another post-industrial city changing shape, instead the entire fabric of society transformed after apartheid made way for democracy. In other words, downtown Johannesburg experienced rapid social change.

The 1990's was a period during which the inner city was in free fall. On the one hand, as landlord-tenant relationships plunged and many properties were left without services, as property owners struggled to come to grips with the changing scenario, the buildings that could not be sold for an acceptable price were mothballed.

On the other hand, many of the major institutions that heavily invested in the traditional core, started to disinvest and reconsolidate their position at the four corners of the traditional CBD. Structurally, the traditional CBD imploded and the result was a hollowing out of the core to a point that it could no longer act coherently and efficiently, particularly in view of the lack of public transport.

It is for this reason that the thesis locates itself in the traditional CBD of downtown Johannesburg where it can analyse the socio-spatial effects that abandonment and neglect have left on once-valued and stable parts of the built environment in decline and in ruin. What would become of the city? How would it operate with a weakened central core? What



Figure

## **BUILDING TYPOLOGY**

### *principles of the original*

Following a mass exodus of corporate offices and luxury shopping uses from downtown Johannesburg, a new type of technology driven building in the suburbs, the existing building stock was left empty and abandoned of use. The subsequent rapid social change that followed, however, gave new life to this stock, raising the question what was to happen to the existing building typology and what inherent qualities it had that could allow it to accommodate a change in use?

Therefore, a technical anatomy of the dominant building typology, the high-modernist office building, is conducted. It aims to deconstruct and transcribe the building, as artefact, in order to understand the relationship between the building elements and investigate how the technical parameters of its function are used to achieve ultimate planning flexibility of floor area (Joedicke, 1962). Furthermore, it aims to investigate the capacity of these parameters to allow for the reconfiguration of the building through a change in function and an increase in its occupancy rates.

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The investigation is used to develop an understanding of the relationship between the building's form and function in order to assess the potential for radical reuse and to reflect the changes in the functional city. The investigation, therefore, positions itself in context of Louis Sullivan's maxim "form follows function" (Wikipedia, 2015). The maxim is a principle associated with modernist architecture and industrial design and insists that the shape of a building or object should primarily be based upon its intended purpose. In this way function becomes a pretext for architectural design that governs the creation of architectural form and is the starting point for this investigation.

Louis Sullivan went on to state that, where function does not change, form does not change (Wikipedia, 2015). However, when function does change because of different needs and new cultural activities, a disjunction between designed form and 'unintended' function develops (Tschumi, 1994). This paper therefore investigates the parameters-structure, services and skin- that allow planning flexibility to be achieved in modernist office buildings with a view to testing the malleability of its space economy for accommodating a range of functions that it wasn't designed for.





The Kelhof building, located on the corner of Pritchard and Delvers Streets, in downtown Johannesburg, is a landmark office building that displays a modernist tower form, wrapped in a glass curtain wall. Since the flight of the corporates from the CBD to the North of Johannesburg, the Kelhof building has since been abandoned, i.e. no function for its form, and therefore makes it the ideal subject to perform a technical anatomy on in context of this investigation. Its parameters of structure, services and skin were considered in a systematic method to which factors of orientation, light and ventilation were applied in order to plan and design the functional form for its office functions (Manasseh, 1962). It was this framework that allowed for a planning flexibility and the continual subdivision of its floor area.

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With this in mind, certain questions begin to emerge: how are the parameters of the modernist office building organised in order to achieve an ultimate planning flexibility of floor area that allows it to be continuously subdivided? And what opportunities that arise when the parameters that govern its form are altered?



Figure

### ***Taxonomy: elements of original building type***

#### *Organisation and planning*

The planning of the overall building shape relies on the successful reconciliation of two spaces, the space of the site and the space occupied by a single worker- also referred to as site and module- to develop a space economy for achieving a ultimate planning flexibility of floor space (Manasseh, 1962). Seen abstractly, the hallmark of modernist buildings is the radical separation between private space and public space that corresponds to inside and outside, where interior space refers to private domesticity and the latter to exterior space of public sociability.

In the case of the Kelhof office building its vertical arrangement is based on Louis Sullivan's correct functional arrangement of multi storey office buildings whose space is let to individual tenants (Joedicke, 1962). It was devised as a threefold division of a public ground zone with large rooms or halls for public purposes at 36m<sup>2</sup> per 24 people, an office middle zone with more closely spaced columns and a services roof zone accommodating the mechanical installations (Joedicke, 1962). The public ground zone is the most important of the three divisions as it holds the more public functions that do not fit in the tight horizontal planning module of the smaller spaces of the office building. These functions take the form of a semi-private podium that raises the office tower two storeys above the street.

The formal composition of the Kelhof office building, is therefore, categorised as an office tower that rises from a low two storey base in which high retail and parking rental costs, at R75 per m<sup>2</sup> and R700 per parking bay, are met with the maximum coverage of the 2217 m<sup>2</sup> site for retail space while the second storey accommodates the functions of the office building that do not fit the tight horizontal planning module of the office tower (David, 2015).

The office tower slab is a building that has grown upward on a restricted downtown site of 63mx47m and its small floor areas of 880m<sup>2</sup> means that for the building to be economical, its proportions must approach that of a tall slab (62mx50mx12m). This initial building shape is then refined according to the requirements of natural light for an ideal work

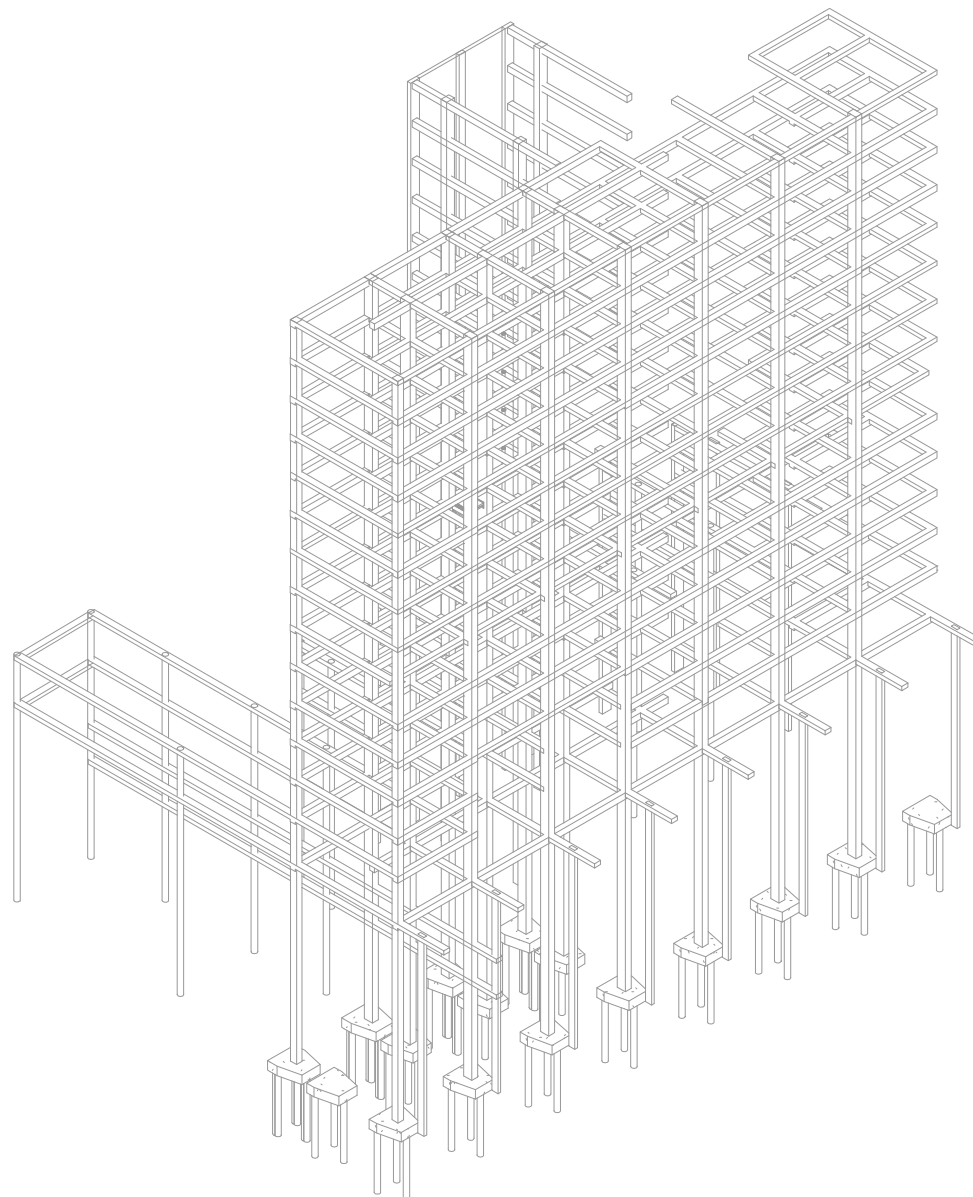


environment, that cannot penetrate more than 6m deep into a building, to set out a 12m deep plan for its North-South orientation (Joedicke, 1962). So efficient is the dimension of this shape that the Kelhof building has been designed with a perpendicular wing of identical proportion as opposed to increasing the depth of the floorplan.

The most important vertical module that arranges the modernist office building is the floor to floor height and its economic aim is to keep it as low as possible and regular so that it allows the columns, walls and services to be standardised giving internal spaces an even height in which partitions can be moved at will (Mannaseh, 1962). The Kelhof building features a storey height of 3.65m which meets the demand of a high storey height of between 3.05m-4.57m that allows natural light and ventilation to penetrate deep into its 12m deep plan (Joedicke, 1962).

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Similarly, the horizontal module sets out the functional arrangement of the office building in plan and in the case of the Kelhof building, the 8.375m wide module, determined by dimensions of the basement level parking bays rather than by the space requirements of a single office employee, defines its open plan office space. This creates a generic floor plate on which multiple uses could exist through subdivision of the floor plate. Despite its open plan layout, the Kelhof building features the use of the corridor as a circulation and access zone when the useable space is subdivided to accommodate several different tenants. In addition, the horizontal module sets out the key types of spaces for the functional arrangement of the office floor plan as useable space, common space, rentable space and service space that are defined by the architectural elements of structure, services and skin.



Figure

### *Structure: Le Corbusier's domino*

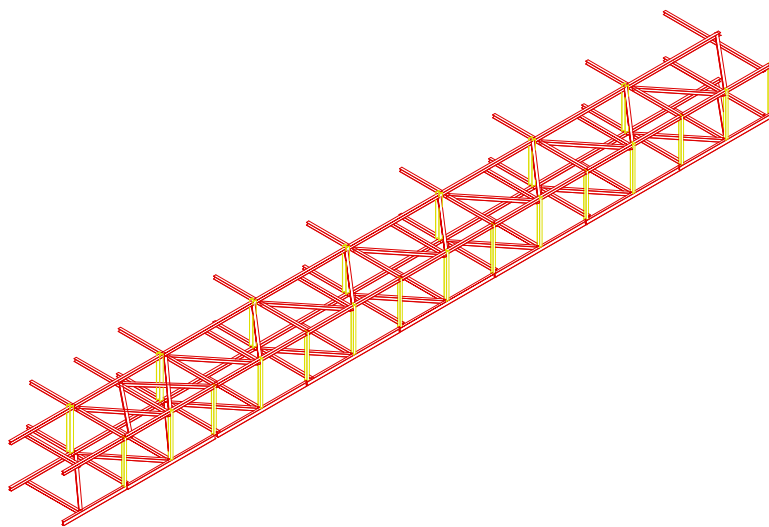
This heading is a technical anatomy of the loadbearing structural system, its arrangement and the vertical and horizontal loading thereof as the first parameter for achieving planning flexibility of floor area in the Kelhof office building. The objective is to keep the useable floor space as clear as possible of structure and services so that it can be continuously subdivided (Neufert, 2000).

The choice of structural system for the Kelhof building was dependant on its shape as a rectangular tower slab, its height at 62m and its need for planning flexibility. All of these factors are resolved through Le Corbusier's domino structure- the reinforced concrete (RC) frame that is able to withstand high loading with very little material while allowing the continual subdivision of floor area between its columns (Mannseh, 1962). Its structural elements include RC foundations, basements, columns, beams and floor slabs set out according to the planning grid, has to cope with a major force in addition to the dead loads of its self-weight and the live loads imposed by the users of the building – wind loads and soil bearing pressure (Cobb, 2004).

The major force, wind loading, is dealt with by the superstructure (Joedicke, 1962). The supporting RC framework that attaches itself to the foundation system is a grid or 650mmx1050mm RC columns that stretch from the basement level to the top floor of the office tower. These are bound together by 400mm deep RC beams that span the transverse direction of the building at a maximum of 6500mm between columns. On top of these transverse beams is a 250mm cast in-situ RC floor slab that's primary function is to carry the live loads of the building. By rigidly interconnecting the beams and columns to create rigid RC portal frames, the transverse bracing system of the skeleton-like framework ensures rigidity of the building in resisting wind loads through portal frame action (Joedicke, 1962). In addition the floor slabs brace the multi-storey building by acting as horizontal diaphragms that transmit the wind load from the face of the building to the vertical stiffening elements, such as the services core, which takes it to the foundations (Joedicke, 1962).

The structural grid is used to serve the objective of achieving planning flexibility of useable space, therefore, it sets itself out in service of the internal planning of the building function. The 8.375m/cc parking module that informs the horizontal planning module is multiplied into a structural grid. The structural grid and planning grid for subdivision of office floor area do not have identical dimensions; instead it uses non-structural mullions spaced at 1250mm centres in the external wall to assist with the subdivision of the floor area. This



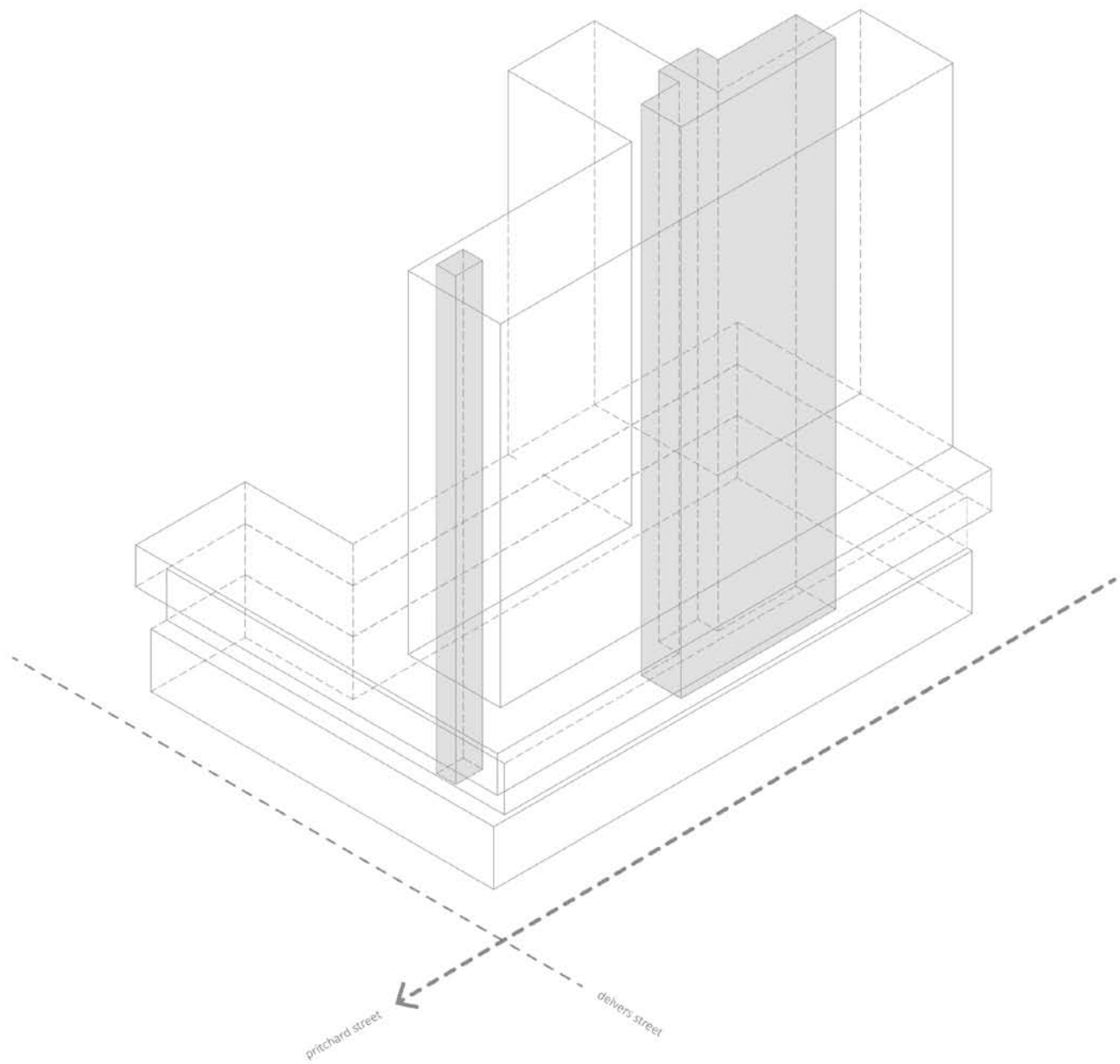


allows a partition wall to be installed on any line of the planning grid. In this way, the technical aspect of structural and planning grids informs the primary setting out of the Kelhof building, however its form can be changed by altering these parameters.

The first change in parameter is a subtraction from the existing floor slab to allow for additional circulation and services to penetrate the vertical dimension of the building or to allow natural light in if the depth of the floor plan increases. The size of the void is limited by the positioning of the RC beams in the transversal direction; therefore a 12m void in the RC slab in this direction is possible and would require one of two methods of structural support as the RC slab carries half the imposed loads and acts as a horizontal bracing to the entire building. Therefore, the RC beams need to be supported either by new columns or by an increase in the depth of the existing beam which then acts as a transfer beam (Jared, 2015).

The second change would be to add new floors on top of the podium level. There is no formula for this, rather it is a process of deciding how many floors need to be added then working back from there to test whether that loading is feasible (Jared, 2015). Effectively there are two forces which act on the building, the loading and the resistance- typically- 0.9MPa offered by the soil pressure, therefore the major factor in adding load is the foundation as much as it is about how much dead and live load is added (Jared, 2015). This means that a large foundation is required in the form of a RC Franki piled foundation with ground beams (Legaspi, 2012) or a process of underpinning. Then as you stack the floors on the existing structure, the loads accumulate on the columns below, leaving the basement level columns to resist the largest quantity of the vertical forces (Jared, 2015). The loading is twofold as it is adding more weight and changing the live load capacity beyond the safety margin. The structure is designed with safety ratio of 1.4 for dead loads and 1.6 for live loads (Cobb, 2004).

The third change to the parameter of structure is the adding of a horizontal cantilevering load to the edge of the 250mm RC concrete slab. The most important aspect in achieving the cantilever would be a back span of twice the length of the cantilever and multiple connection points (Jared, 2015). A maximum cantilever of 3m can be achieved with one of the following three methods that ideally uses lightweight steel as its structural material in order to reduce its self-weight. A 1m deep RC beam on top of which a 200mm RC cast in situ slab is cast, bolting a 200mmx100mm steel I-section to the edge of the RC slab and using two diameter 15mm tension cables to suspend the cantilever from the RC slab above or not cantilevering but instead spanning a RC slab across to new columns (Jared, 2015).



Figure

### *Services core: taxonomy of circulation, services*

This heading deconstructs the arrangement and the types of services featured in the Kelhof building in relation to the functional arrangement of its floor area. In this sense, services becomes the second parameter that allows planning flexibility of floor area.

The Kelhof building, like most other office buildings, features the fundamental tangible services types of primary and secondary circulation (20%), water and sanitation (15%) and HVAC system for artificial ventilation (2%) for a total combined service area of 37% of the total available 880m<sup>2</sup> floor area.

The principle is to group the services together for efficiency and to keep space clear of obstructions so that ultimate planning flexibility of useable space can be achieved (Joedicke, 1962). The ideal scenario is if the service core is separated from the building, however this requires additional external wall area which increases cost as seen in the Admin building for Inland Steel Company in Chicago by Skidmore Owings and Merrill (fig 19).

In Kelhof building, the services are therefore organised in a 100 m<sup>2</sup> service core that runs the south vertical length of the building and in a 650mm deep suspended ceiling that distributes services along the horizontal length of the building. The capacity of these services have been designed and quantified for its desired occupancy rate of 176 people per floor and relative to its floor area. This is measured as a space utilisation ratio that demands a floor plate efficiency of 75% (Joedicke, 1962).

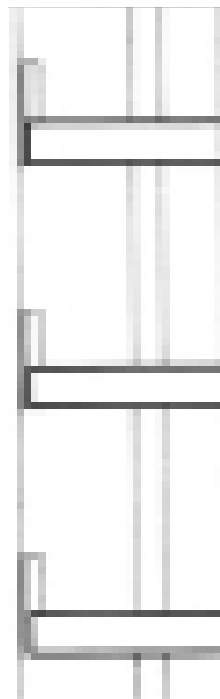
The building's services core consists of four passenger elevators as the main vertical circulation system and two service elevators both with lobbies, three staircases, one fire egress stair located on the West face of the building, four female toilets, one male toilets, electrical risers and a mechanical room on the roof. Further vertical arrangement of services, such as rainwater downpipes, are accommodated in the main plumbing ducts of the core or in ducts formed as an extension of the cladding around structural RC columns.



Figure



Figure



Figure

### *Skin*

This heading deconstructs the skin as a separate, non-structural component of the building that functions merely as a line of enclosure, but has the potential to relate to both the structural system and to the services co-ordination.

It was the introduction of steel and RC frame construction that resulted in a number of important changes in the methods of external wall construction (Manasseh, 1962). It now became possible to divide the loadbearing, enclosing and heat insulating functions of the building among separate structural layers specifically designed for these purposes (Manasseh, 1962). The skin as a series of layers allows it to be altered easily compared to a fused skin. In this way, the skin construction becomes the third and final parameter for achieving ultimate planning flexibility in the Kelhof office building.

This separation between structural and non-structural material is a central feature of modernist office buildings that allows it to be assembled from mass produced, factory made, prefabricated components (Manasseh, 1962). The skin of the Kelhof building is suspended in front of the RC frame and consists of light-weight aluminium, floor to floor, cladding panels that functions merely as an enclosing and insulating unit to make the structure weather proof. Furthermore, the principle of flexibility of layout, which underlies the whole process of planning in multi storey office buildings, requires movable partitions separating the offices on each floor (Joedicke, 1962). The skin, thus, comprises non-structural 100mmx150mm steel mullions that allow the floor area to be subdivided at 1250mm centres set out from the structural grid lines. These mullions emphasise the vertical nature of the building, but is subdued by the horizontal bands on the external wall that emphasise its tower building form.

The light weight skin in Kelhof building implies a bolted connection to the edge of the 250mm RC floor slab which means that it takes up 0% of the floor area. This allows the floor area to be maximised for useable space. The cladding panels that are bolted to the edge of the RC slab are received by 75mmx50mm steel angle fixing brackets spaced at 1250mm centres. The total weight of each panel is estimated at 190kg per m<sup>2</sup> which confirms the assumption that the lightweight construction of the external walls reduces the loads to be supported by the structural reinforced concrete frame of the building.



Figure. Strategy for repurposing the existing building stock through bulking up the existing podium

### *Conclusions*

The conclusions that can be drawn from this anatomy is that these building types offer generic usable floor space that has planning flexibility. The development potential lies in the podium level where additional bulk can be added. The problem with increasing the capacity of the existing building is that the existing quantity of services and resources cannot support increase in occupancy rate. Furthermore, the building is not responsive to environment as there is no solar shading on the 60m long north facade.

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The typology is based on the principle of stacking and vertical separation of public and private uses. This is the hallmark of modernist planning, the radical separation between public space and private space- a demarcation between inside and outside, where the former refers to the interior space of private domesticity and the latter to the exterior space of public sociability.



Figure

**NOW:**

**URBAN(ISM)**

*The changing city: a modernist city in decline to a resourceful urban(ism)*

Johannesburg's urban decay was indeed initiated by the need for more efficient buildings. Rapid social change saw people who were previously denied access to centrally located housing by the barriers of the apartheid system, flock to the downtown area and Johannesburg was again filled; albeit with a different demographic. In addition, the opening up of Park Station to the continental transport network unlocked Johannesburg to citizens across the continent.

In the early 1990's a large influx of new city dwellers made downtown Johannesburg their home and now this, once model industrial city of large-scale corporate offices and high-end retail outlets, has to accommodate and support an urban population of 400 000 new permanent residents- of which 90% were not living there 10 years ago. It was the available existing space and sheer volume of people that was the resource that attracted new residents to migrate to Johannesburg, despite a lack of services and maintenance that resulted in decaying of the building stock.

In this condition downtown Johannesburg, like Africa's other burgeoning metropolises, frequently understood as failed cities, was unable to provide even basic services and whatever resourcefulness did exist was regarded as only temporary compensation for fundamental failure. In 'For the City Yet to Come', Abdou Maliq Simone argues this point and states that by overlooking all that does work in Africa's cities, this perspective forecloses opportunities to capitalize on existing informal economies and structures in development efforts within Africa. Simone contends that Africa's cities do work on some level, in that they function largely through fluid, makeshift collective actions running parallel to proliferating decentralized local authorities, small-scale enterprises, and community associations.

He goes further to project that these residents are potentially saying: "we are in the city now; we must do whatever it takes to make the city work for us, even if it means by doing so, the city is less capable of working for others". The conclusion drawn from these lines of thought is that the primary resource that urban Africans have had to draw upon to make their cities and configure an urban public life has essentially been themselves. Ultimately, the city has changed through the efforts of its people.



Figure

In this way, these new residents rely on their own capacity to create a support network of resources that can fill the void left by government authorities, the city and landlords. They make their environment work for them by domesticating the city through five primary uses of sleeping, cooking/ eating, meeting, shopping/ selling and transporting/ freighting that come together to produce urban amenities capable of supporting life in an urban environment that was not designed to be lived in. This represents a marked shift away from the original uses of mining and manufacturing toward services and consumption.

Despite, downtown Johannesburg being subjected to a steady stream of formal regeneration efforts, to counter the effects of urban decay, this emerging process of remaking the city is as valuable an effort as any and deserves recognition.

This approach to remaking a city that has been 'let go' is further captured in Abdou Maliq Simone's text "People as Infrastructure: Intersecting Fragments in Johannesburg", where he describes a tentative and often precarious process of remaking the modernist city. The kind of city that is characterised by incessantly flexible, mobile, and provisional intersections of residents that operate without any clear delineations of how the city is to be inhabited and used. To achieve this type of city, he advocates for a reconceptualisation of the term infrastructure that supports a city, which is understood in physical terms as reticulating systems of highways, pipes, wires, or cables that makes the city productive by positioning its residents, territories and resources in specific ensembles. Instead, Abdou Maliq Simone extends the notion of infrastructure directly to people's activities in the city where these kinds of intersections depend on the ability of residents to engage complex combinations of objects, spaces, persons and practices- a platform providing for and reproducing life in the city.

This sets up a different relationship between city and building, between existing space and different forms of inhabitation, between city and representation, a different urbanism that produces a different urban experience and relies on a tactical approach to re-building and re-strengthening the city central core- making it productive again.



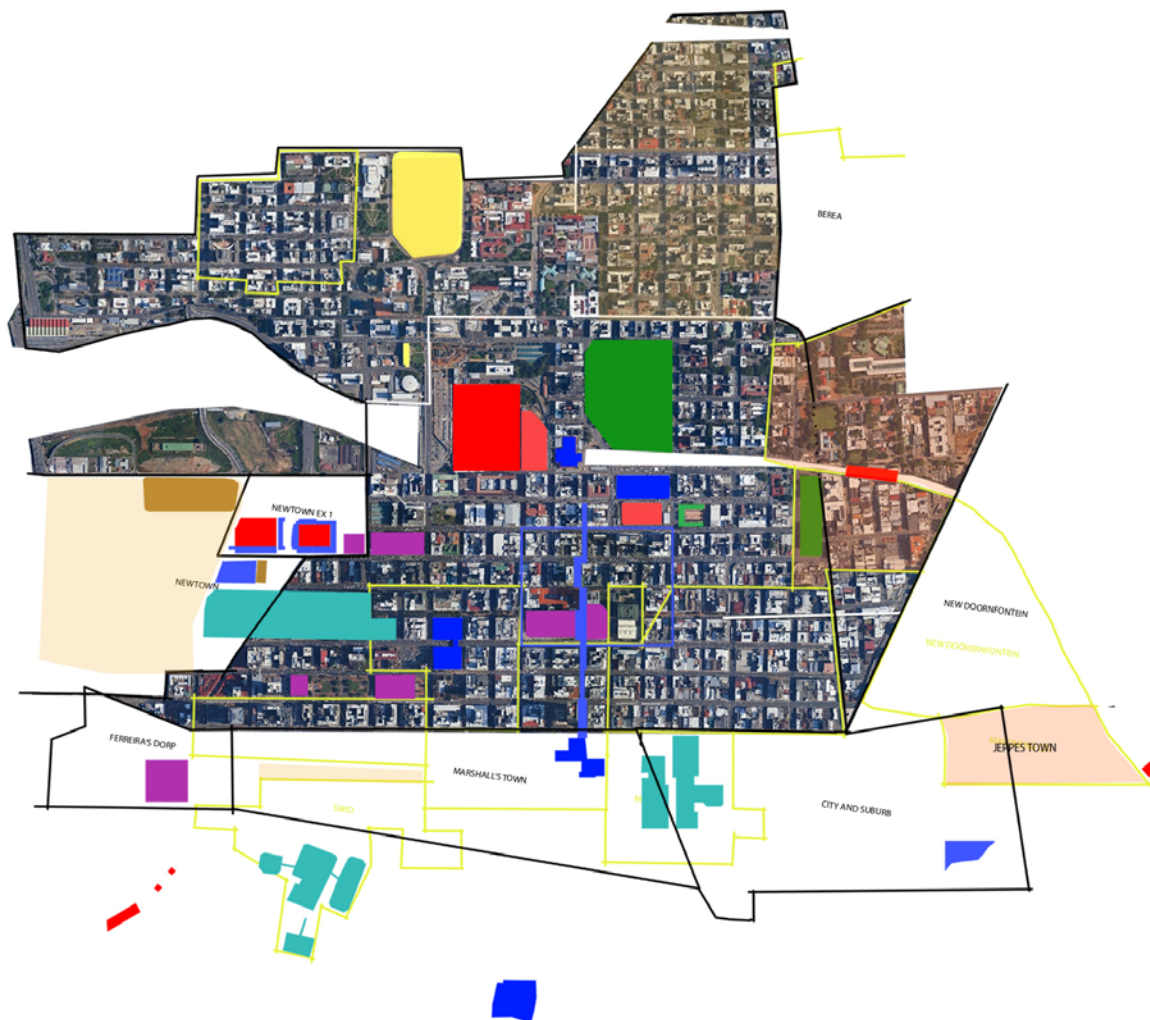
Figure

Abdou Maliq Simone's 'For the city Yet to Come' already exists, but the architecture is yet to come and be developed in response to this explicit condition. Where the public environment is underserved as a result of an increase in population density, what kinds of architectural interventions are to come that can adapt the modernist fabric to the changes of a city that was not designed to be lived in? And now that the city's use has changed, what does this mean for the existing building typology? Can it undergo a process of transitioning and respond to the changing city? How can it now act as a resource to the city and re-strengthen the weakened city core?

To make sense of the city-building processes that have spatially reconfigured the urban landscape of Johannesburg requires the adoption of an interpretive approach of acknowledging the interplay between surface layers and the deep structural forms.

The intention of the thesis is to maximise the potential benefits of this kind of complex urbanity which are most evident in its changing urban fabric. Therefore, I analyse a sample of the existing urban fabric, the existing space as resource and the changing uses to understand the spatial restructuring of the weakened central core and the layers of organisation of uses.





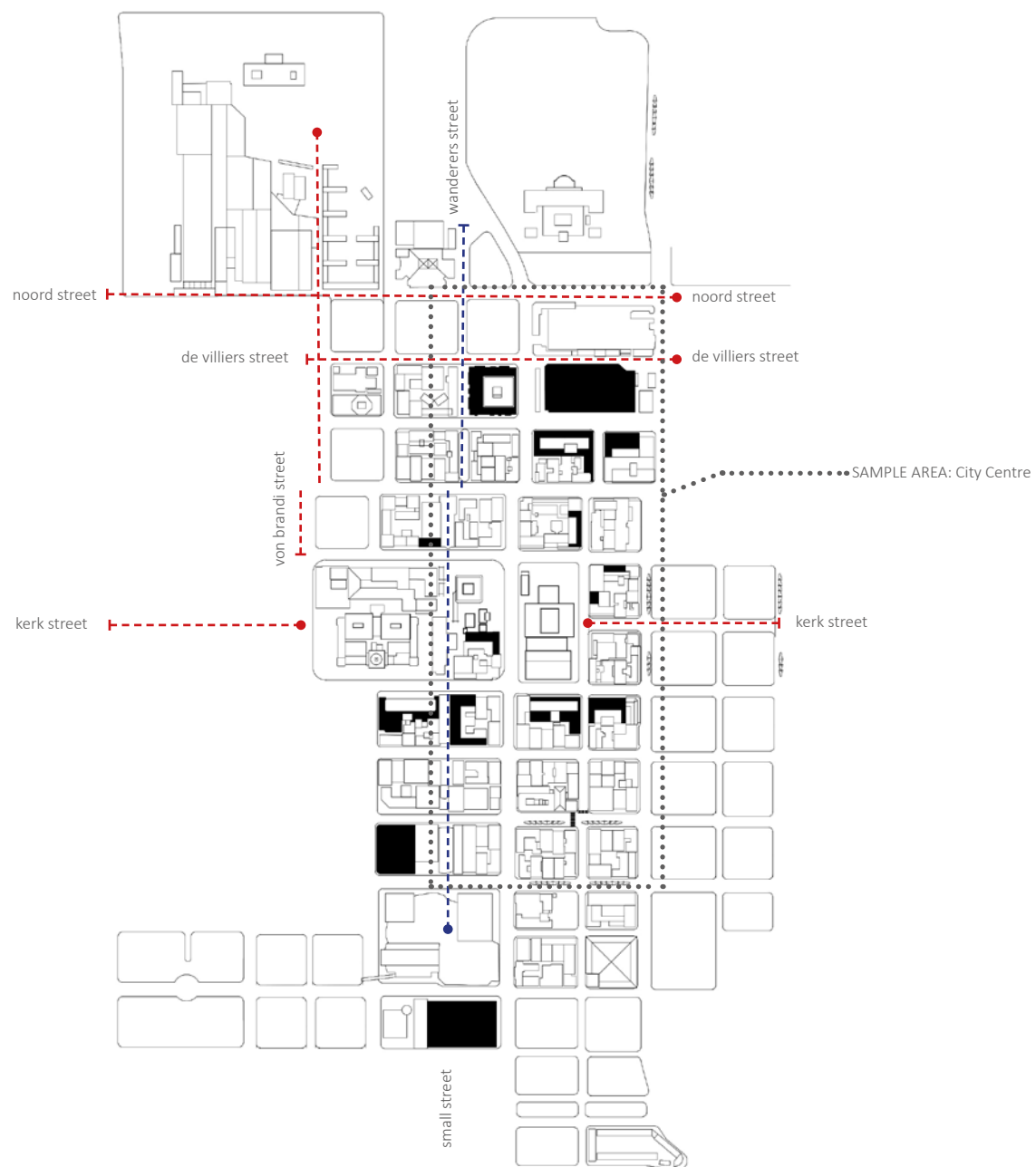
Figure

***Taxonomy: elements of urban structure***

*existing transport and retail urban anchors*

The emerging structure of downtown Johannesburg is based on large-scale, very specific transport and retail urban anchors that allows generic urban and architectural spaces to respond to its gravitational pull. These anchors are overlaid onto the existing modernist grid to restructure the urban environment. In the north a cross-border train station in Park Station, a taxi rank and two shopping malls combine with The Garden Pavillion and the BRT stops to create and hold a series of north-south pedestrian routes that are overlaid onto the existing east-west pedestrian network. The strength of these routes have been identified and can be experienced in the enclosed Small Street retail urban arcade that has been inserted between two city blocks to create a superblock. This arcade is a tactical approach to regeneration as it works with the existing urban fabric to become an urban anchor itself and allow parallel systems of programme to run along its length.





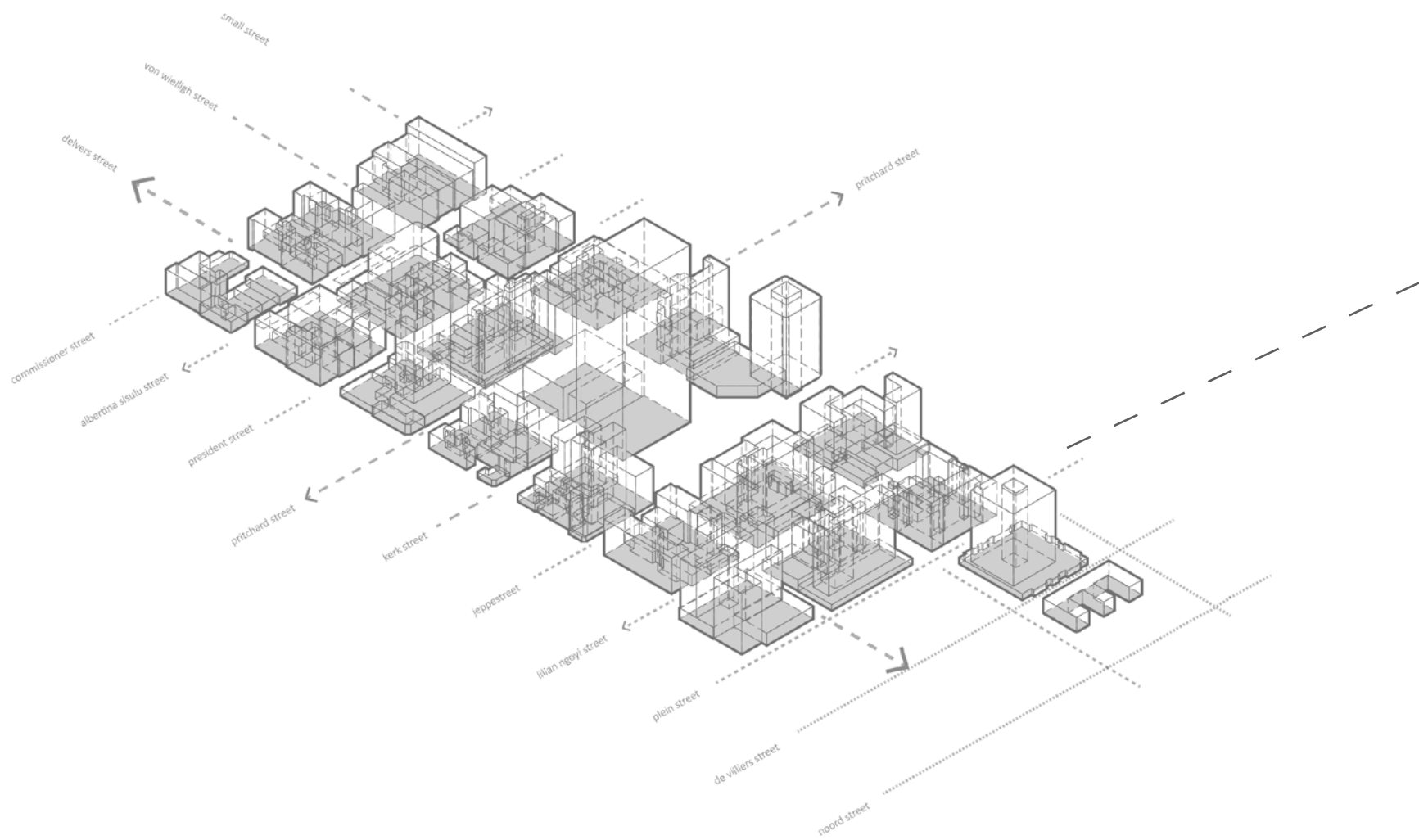
Figure

*pedestrian network: pavement*

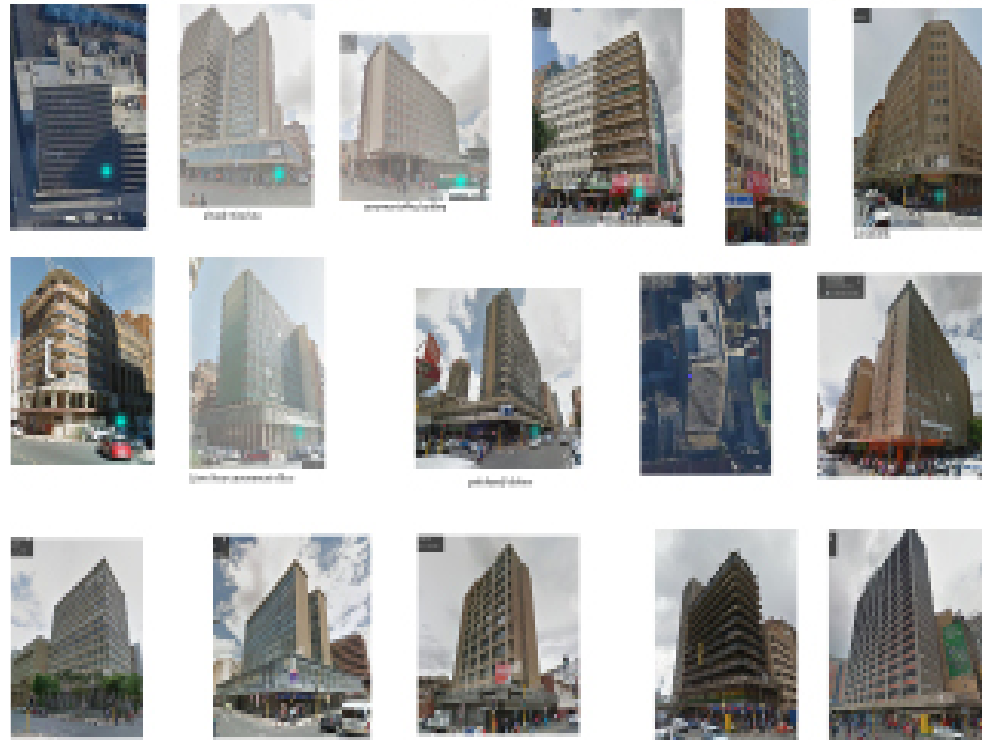
The city is becoming more pedestrian oriented as private vehicles have left with the capital shift to the Northern Suburbs. Downtown Johannesburg has started making this transition as evidenced through the open air pedestrian routes of Kerk Street and Noord Street and the covered arcades of Small Street where sidewalks are becoming wider and in many cases, completely pedestrianised.

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This means that residents of downtown Johannesburg predominantly walk to and between their downtown destinations and the road which was designed for the vehicle is now used by pedestrians. In this way the overall generic grid of streets gain specificity in relation to the network of anchor uses it directly forms a part of and establishes an urban circulation system based on the new function of the city.



Figure

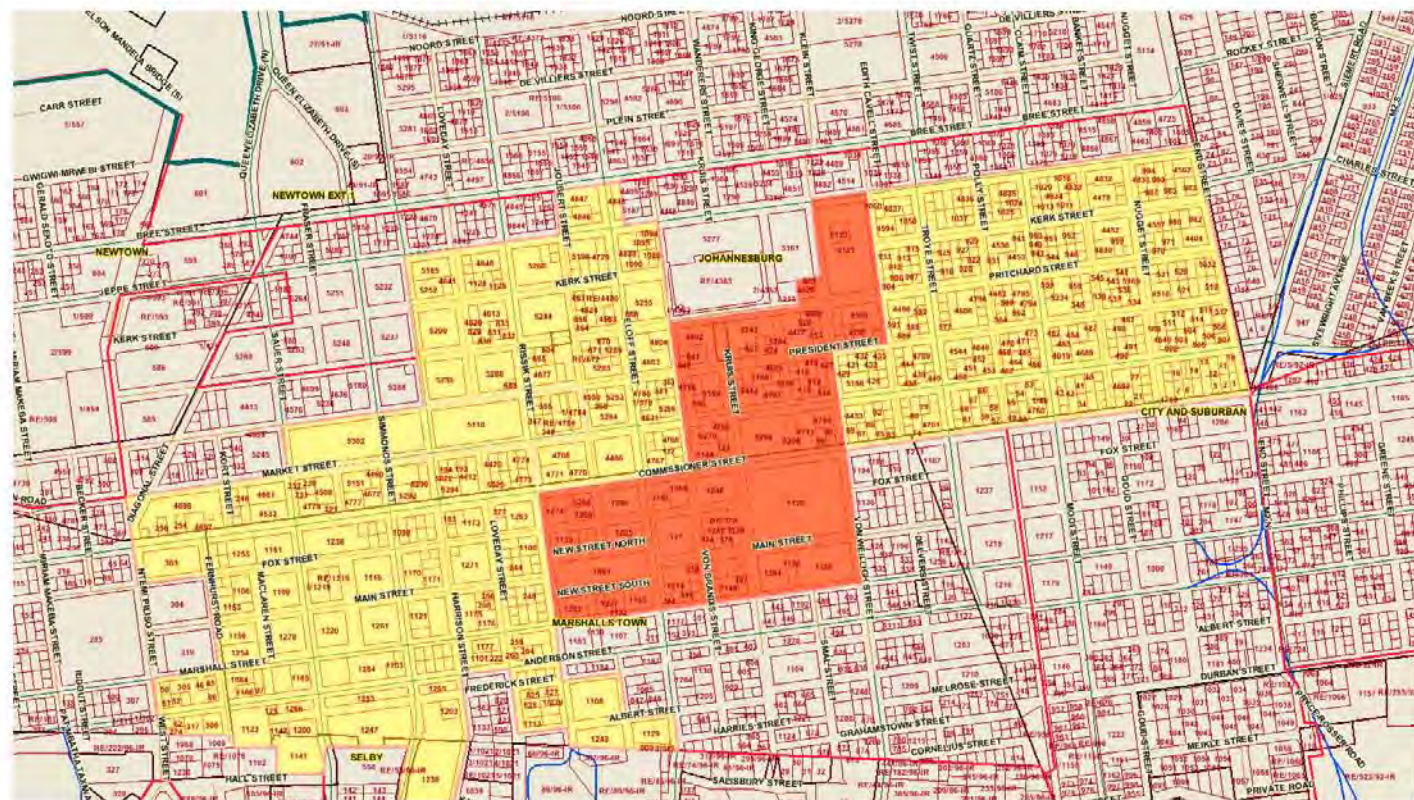
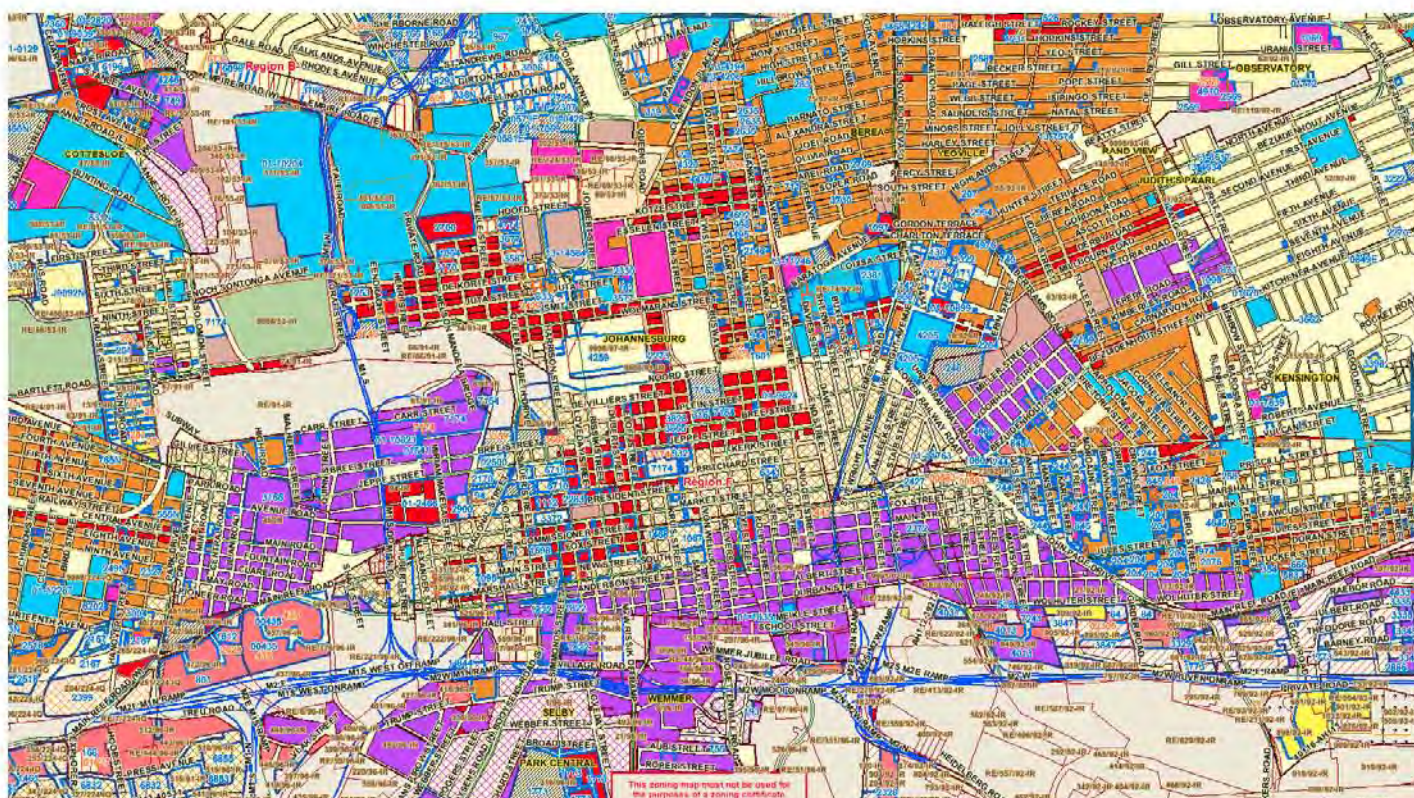


Figure

*existing built form, empty buildings, existing space as a resource and potential sites*

The existing urban form of downtown Johannesburg is shaped largely by the podium building typology of an office tower on top of a retail base. These building types are the city's greatest resource as they hold the greatest generic spatial potential to explore an urban and architectural strategy aligned with resourceful urbanism- as evidenced through current informal reuse. The tower and base typology creates an active street front at ground level, but not above, and therefore a positive pedestrian experience. This is in line with the hallmark separation of public and private, inside and outside, domestic and public relationship set out by modernist planning.



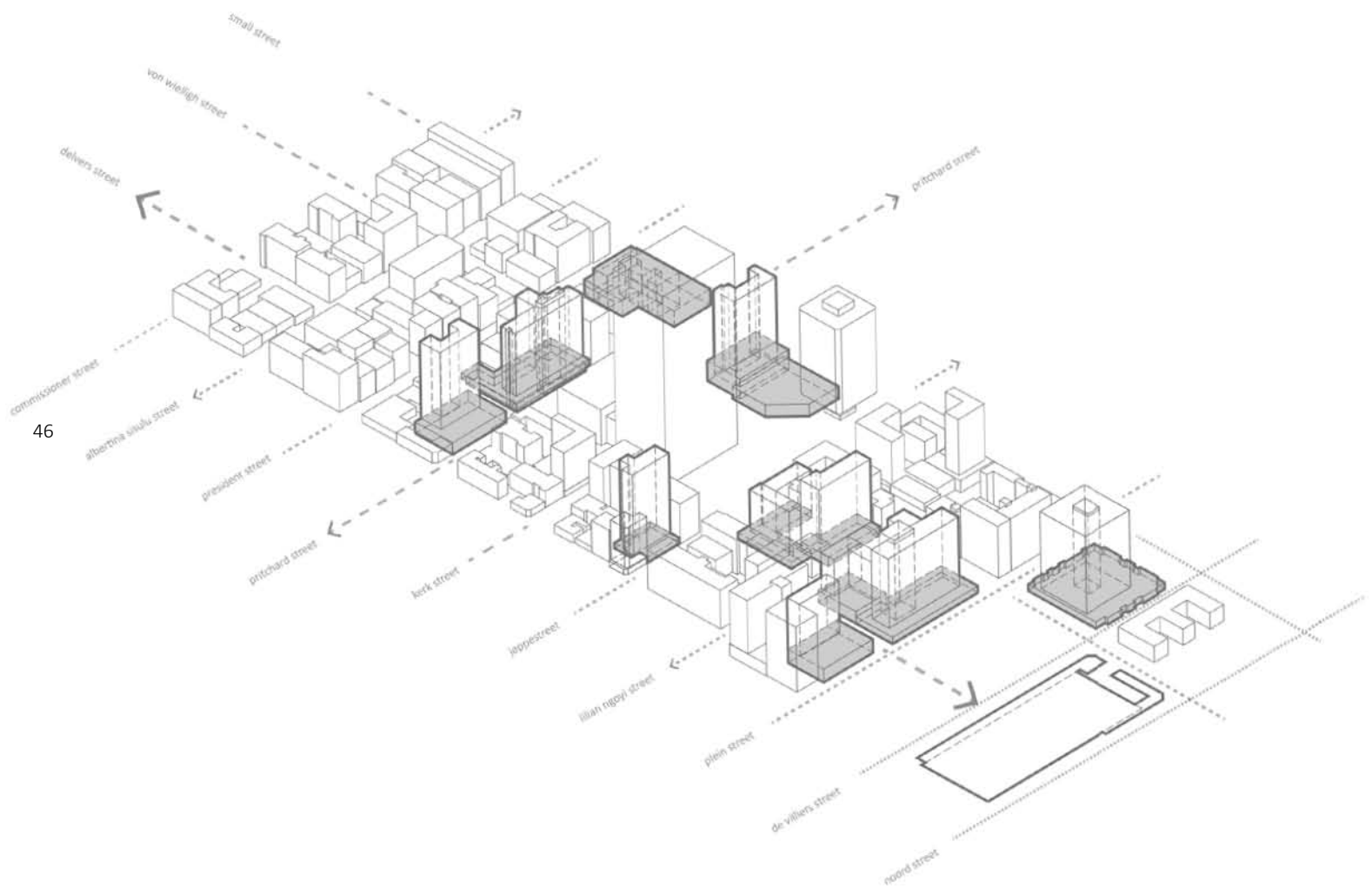


Figure



*formal land use, improvement districts and informal districts*

The formal land use for the central core of the city, as set out in the land use map, comprises high volumes of retail in the north, high volumes of light industrial in the south and moderate volumes of general use in between. Overlaid onto these formal land uses is a strategy for regeneration that seeks to disaggregate the vast city into smaller, manageable areas known as improvement districts and nodes. The districts respond to its primary formal land use. Together these two maps create a framework onto which a closer reading of the urban uses is laid.



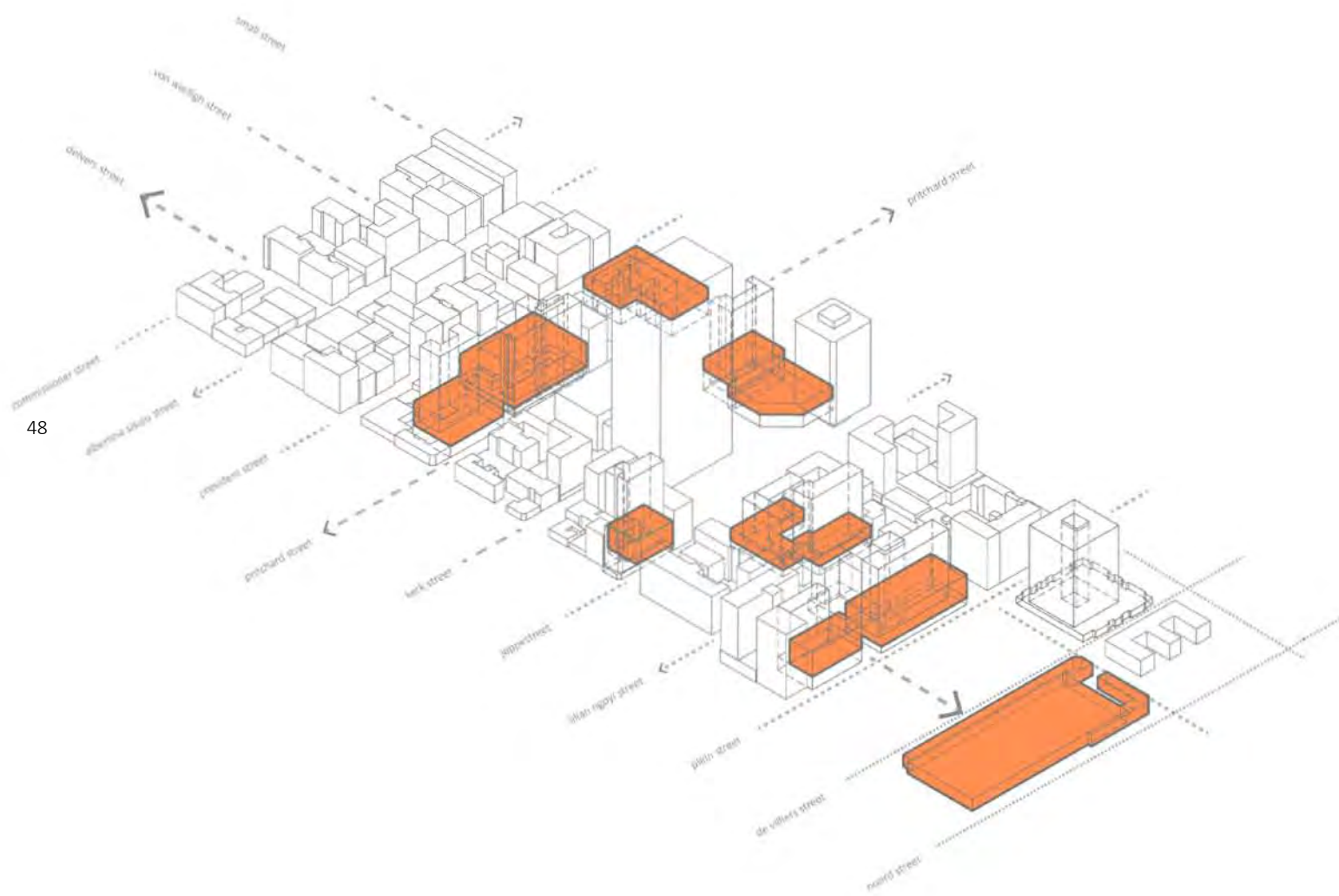
46

Figure

*increasing capacity and redistribution of bulk for infill buildings in relation to anchors*

While there appears to be a lot of existing space to reuse and inform the project, the existing bulk seems to be located in the 'wrong' areas. With an increase in retail activity and a decrease in office activity, the bulk of the tower needs to be displaced to the retail base which increases the existing capacity of the building in the areas that matter for retail, urban amenities and resource uses. In this way the base creates a public space that transcends the traditional street and square model. This model ties in with the existing UDZ form 5 that kicks in when an investor erects extends, improves or adds to part of a building representing a floor area of at least 1000m<sup>2</sup> as part of CoJ's effort to incentivise development in the downtown area, attract new programs and aid the process of regeneration.





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Figure

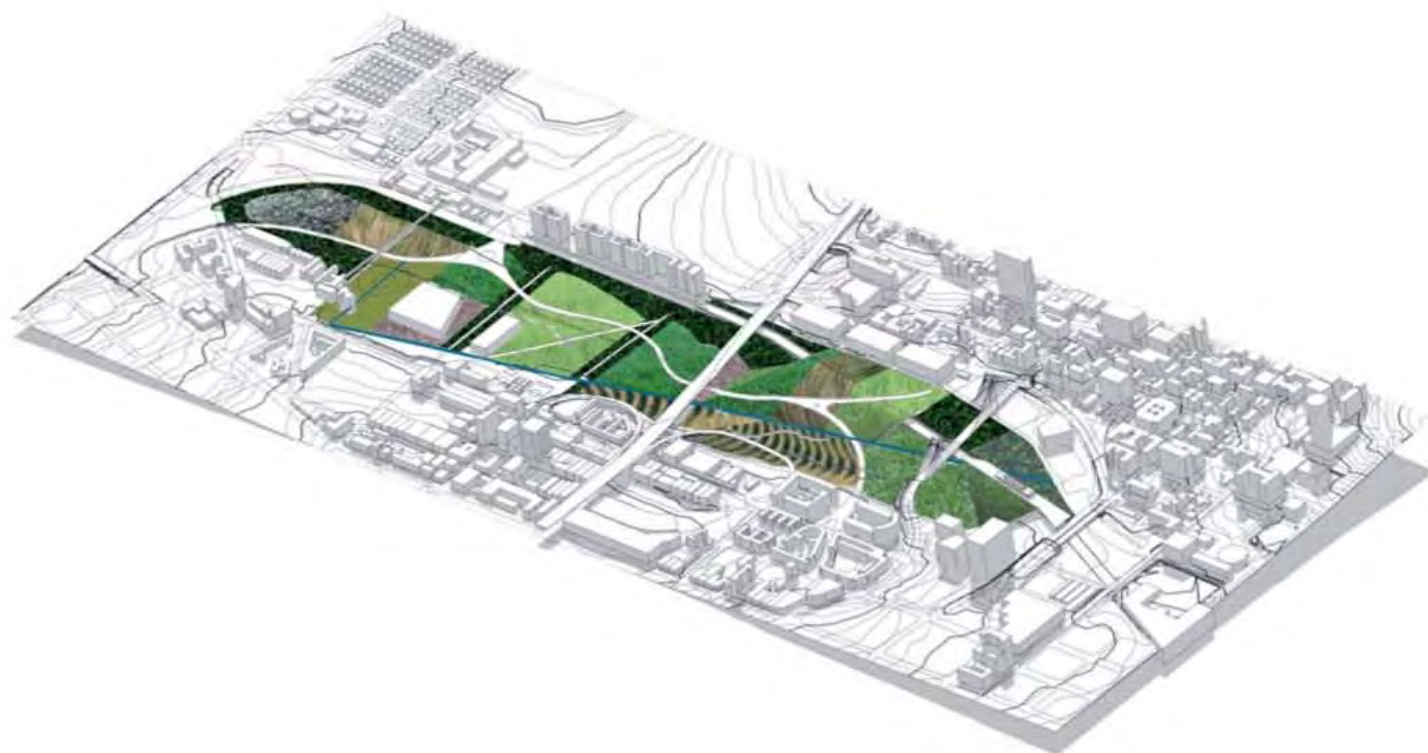
*forms that emerge*

A simple mass with 100% coverage is placed on top of the modernist public retail base and creates a thickening of the intensely used ground plane. The urban position of these masses are located strategically in relation to existing urban anchors and potential changing urban uses. These ready-made forms of generic building stock are used for testing the organisation of new uses, by extending the existing base upward which sets up new use forms in relation to city wide anchor uses.



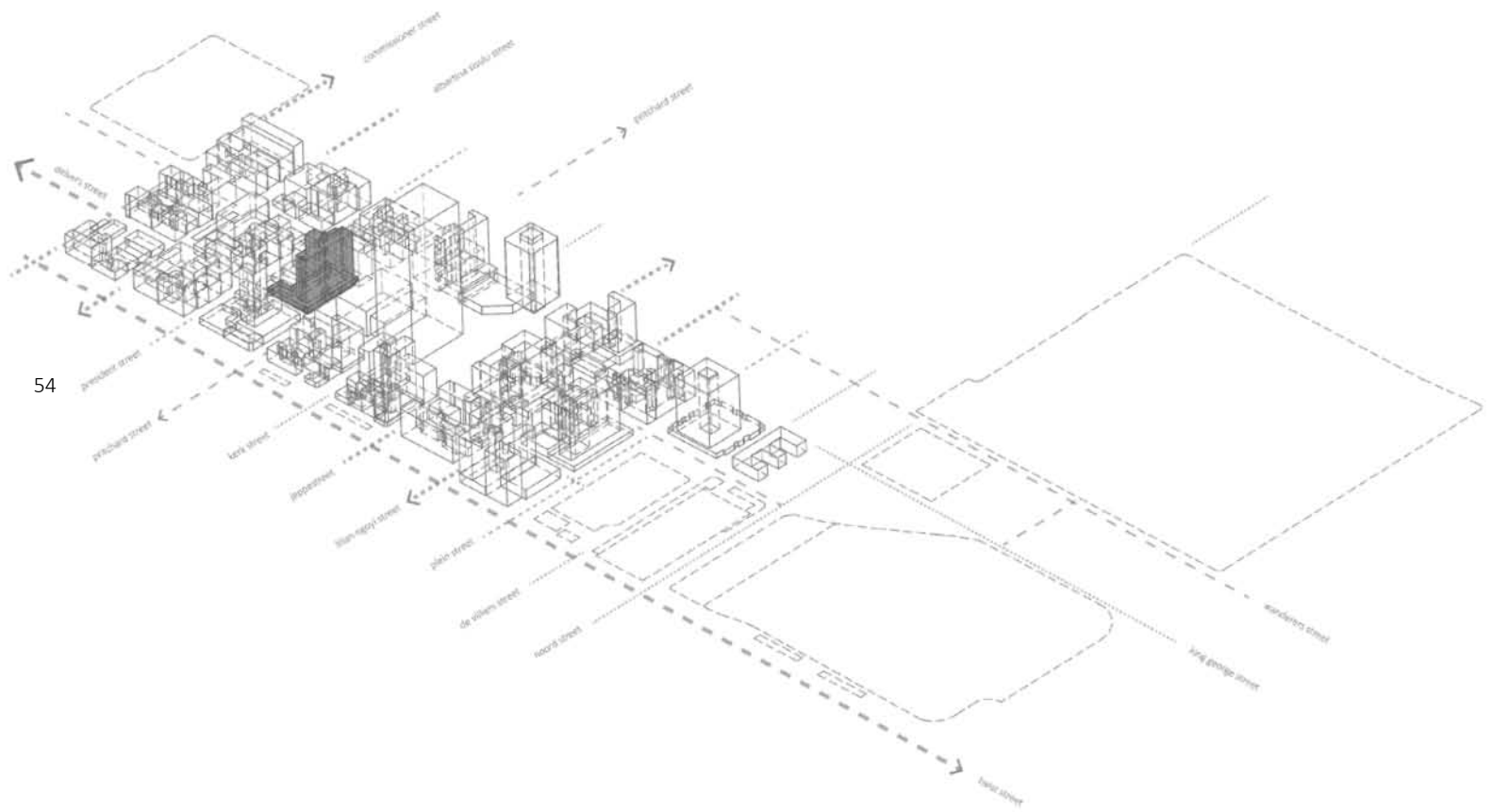
*network: resource infrastructure network offers potential for regeneration (all layers)*

Together the individual masses have the potential to act as a part of a larger whole to create a network of tangible and intangible resources that stimulates the regeneration of downtown Johannesburg as a tactical approach in comparison to the traditional conception of the scale and scope of a ripple effect project. In this way a lump sum investment can be distributed across multiple interventions on multiple buildings rather than a single project that aims to regenerate the declined functional city. If this network is maintained and built upon, downtown Johannesburg can be used in multiple new ways, can manage the complexity in disjunction of use and form and can support its new resident population.



Figure





Figure

Township	JOHANNESBURG
SG ID	T01Q018300000004548000000
Land type	ERVEN
Status	REGISTERED
Stand number	4548
Region	F
Ward number	60
Area(m²)	2217.32529384
Market value	98340000
Owner	AENGUS LIFESTYLE PROP PTY LTD
Zoning	General

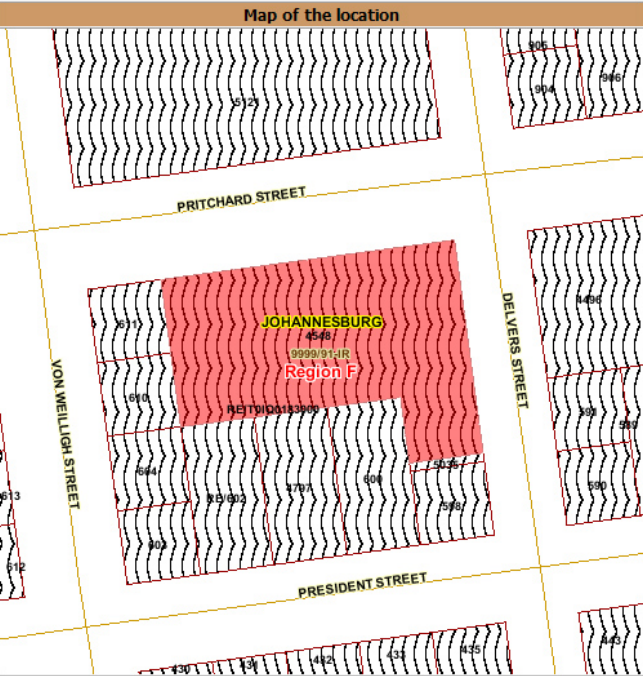
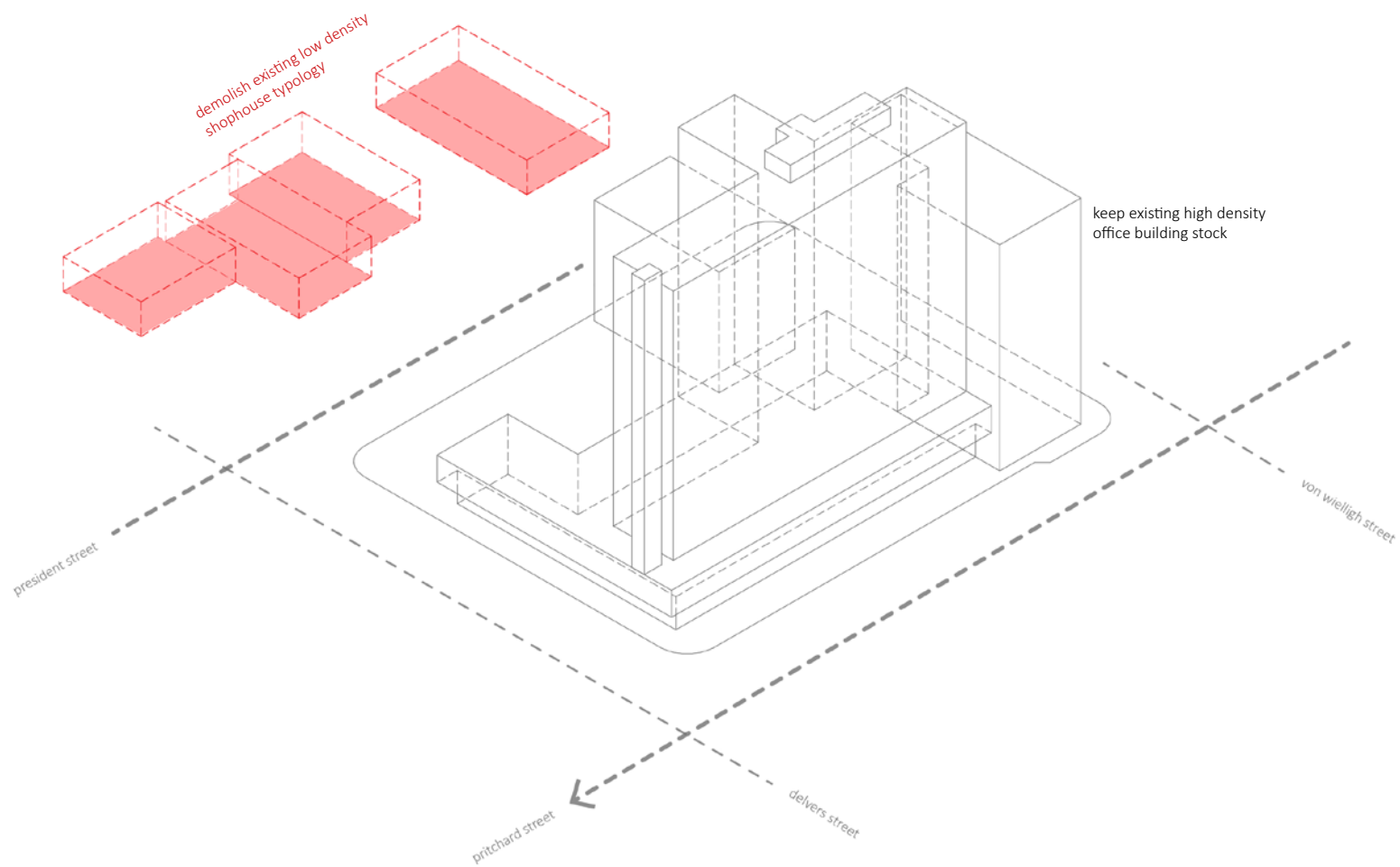


Figure  
*site selection*

The site selected is located on the border of an extremely active retail part of downtown Johannesburg that displays the discussed characteristics of a changing city- ‘Jeppe’- and along one of the north-south gravitational routes that connects retail and transport infrastructure and runs parallel with Small Street retail arcade. The Small Street arcade is located in the retail improvement district.The Kelhof building sits on the corner of Delvers and Pritchard streets along the eastern border of the central improvement district in the central core of the city where it meets the fashion district with a formal land use of light industrial. Effectively, the selected existing building sits at an important intersection of various networks and layers that is counter to locating it immediately adjacent to an existing urban anchor.

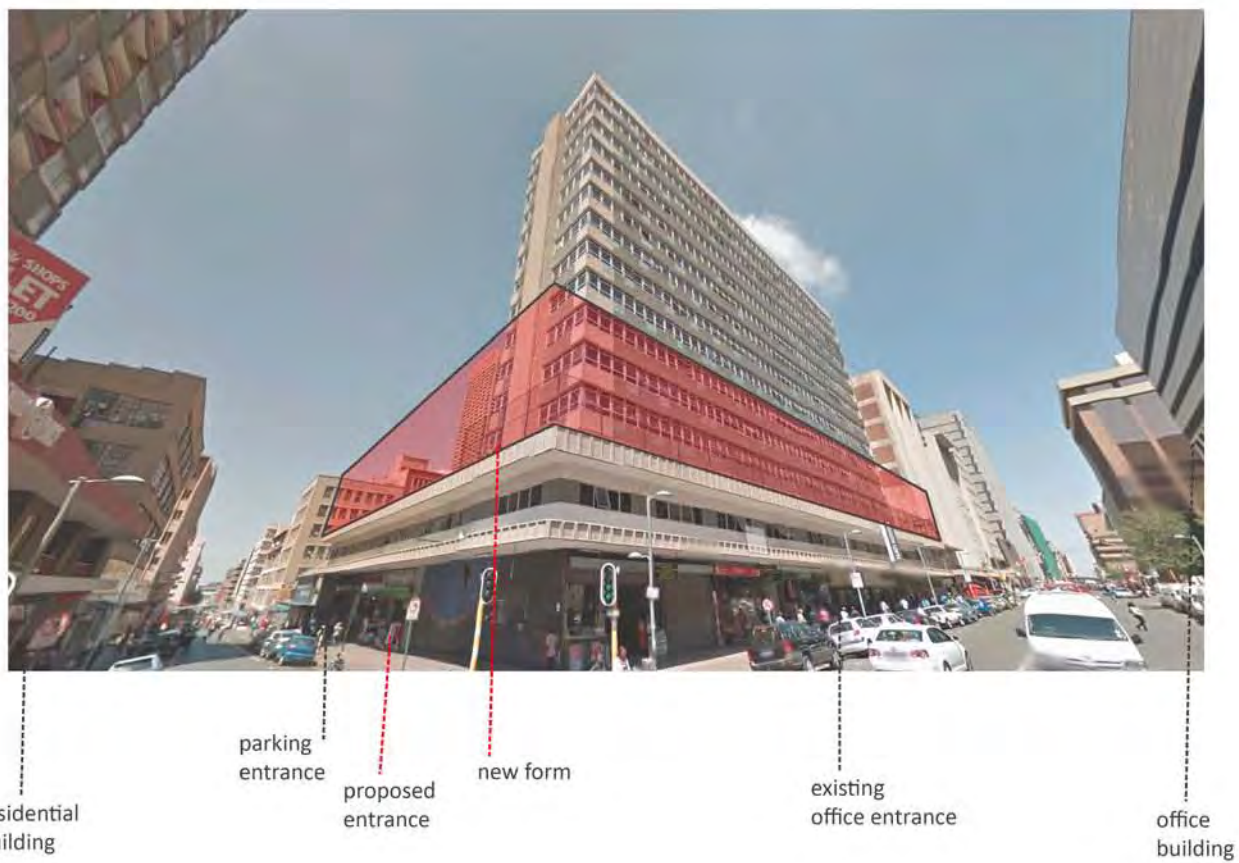




Figure

### *approach to block*

This dissertation deals with the spatial potential of an existing building and not the entire city block, however, the building's position as part of the block must be noted and a strategy must be developed. The Kelhof building is a fifteen storey tower that is surrounded by single, double and seven storey shop houses and office buildings. The strategy, simply stated, is that the smaller neighbouring buildings hold very little value on such a valuable site in the heart of the city and would therefore be demolished leaving them open to setting up new relationships with primary tower of the block. While this remains true for most sites with this building type on it, the configuration of the mass must accommodate for these changes by setting out architectural rules to which the new buildings meet it.



Figure

## **TYPOLOGICAL REVISING/ REMAKING**

This part of the dissertation is an exploration of the architecture that represents the current urban condition of downtown Johannesburg. The city has changed, as captured in Abdou Maliq Simone's title 'For the city yet to come', however the architecture has yet to respond to this change. While the new permanent residents have made the city productive again through the resourceful use of its existing space, for purposes that it wasn't designed for, it has not been done in a satisfactory way.

As the use of the city changes, so the ratios of uses that existing buildings must accommodate must also change. This becomes a major formal informant for the transition of the existing building typology where different uses require different spatial conditions that can be satisfied by increasing the capacity of the existing building. This alters the relationship between the elements of the building and therefore alters the existing office typology. This transition features adding of mass, services and resource uses.

Furthermore, the project aims to test the capacity of the domino and the flexibility of floor area offered modernist planning to create generic space that allows for change in use. In this way, the project moves beyond a space planning exercise of merely converting an office building into a residential building.

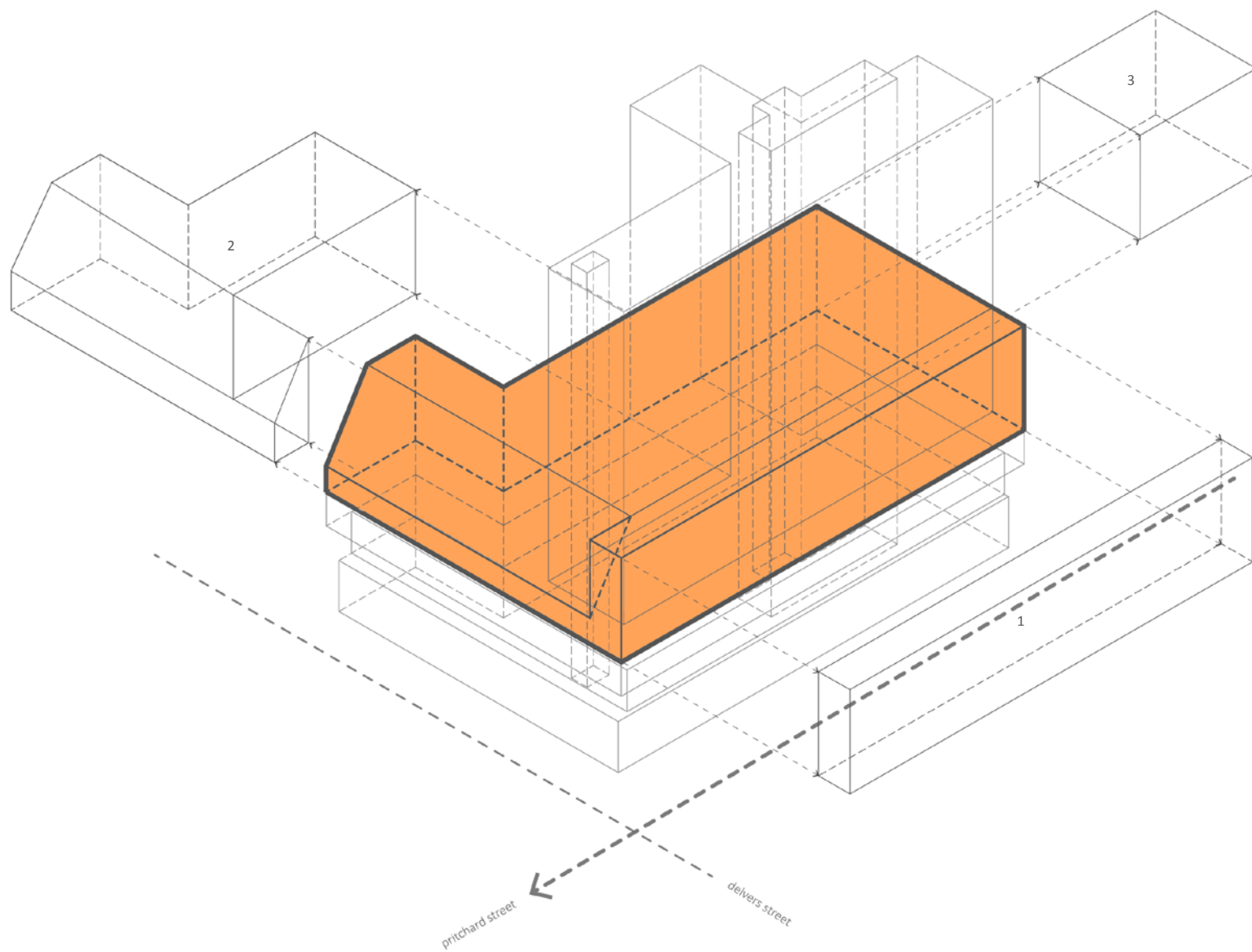
It is safe to predict that during the life of the building, the uses will undergo constant change and adjustment. The more the building works, the more it will be in a state of revision. Its 'design' should therefore be the proposition of a building as a resource that reflects the changes in the city where urban occupancy rates and use ratios have the potential to increase the building's carry capacity. This scheme is not simply a design, but a tactical proposal to derive maximum benefit from urbanity and the implantation of new uses in the existing building forms that become part of the urban experience of downtown Johannesburg.

The notion of a resourceful urbanism has since been used to drive an overall attitude in the architectural and spatial process, and can be seen in the treatment of the existing space, the uses, the circulation and the urban form.

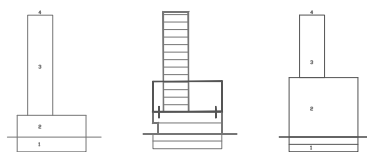
The project is conceived of as a series of resource 'add-ons' to existing buildings to create a network of resources that supports new permanent residents who are living in a city that was not designed for them to be living in. In the process, the network of urban amenities aids the process of urban regeneration of a once decaying urban environment. In this way, the project sets up a new, mutually beneficial relationship between building and city and between resident and city. Now the building can be appropriately conceived of as a city in a building.

Strategies of inserting, layering, reconfiguring and tactics of adding and subtracting are used to organise the uses of the transitioned building typology, while anchor and infill uses are used to structure its uses.

+ 60



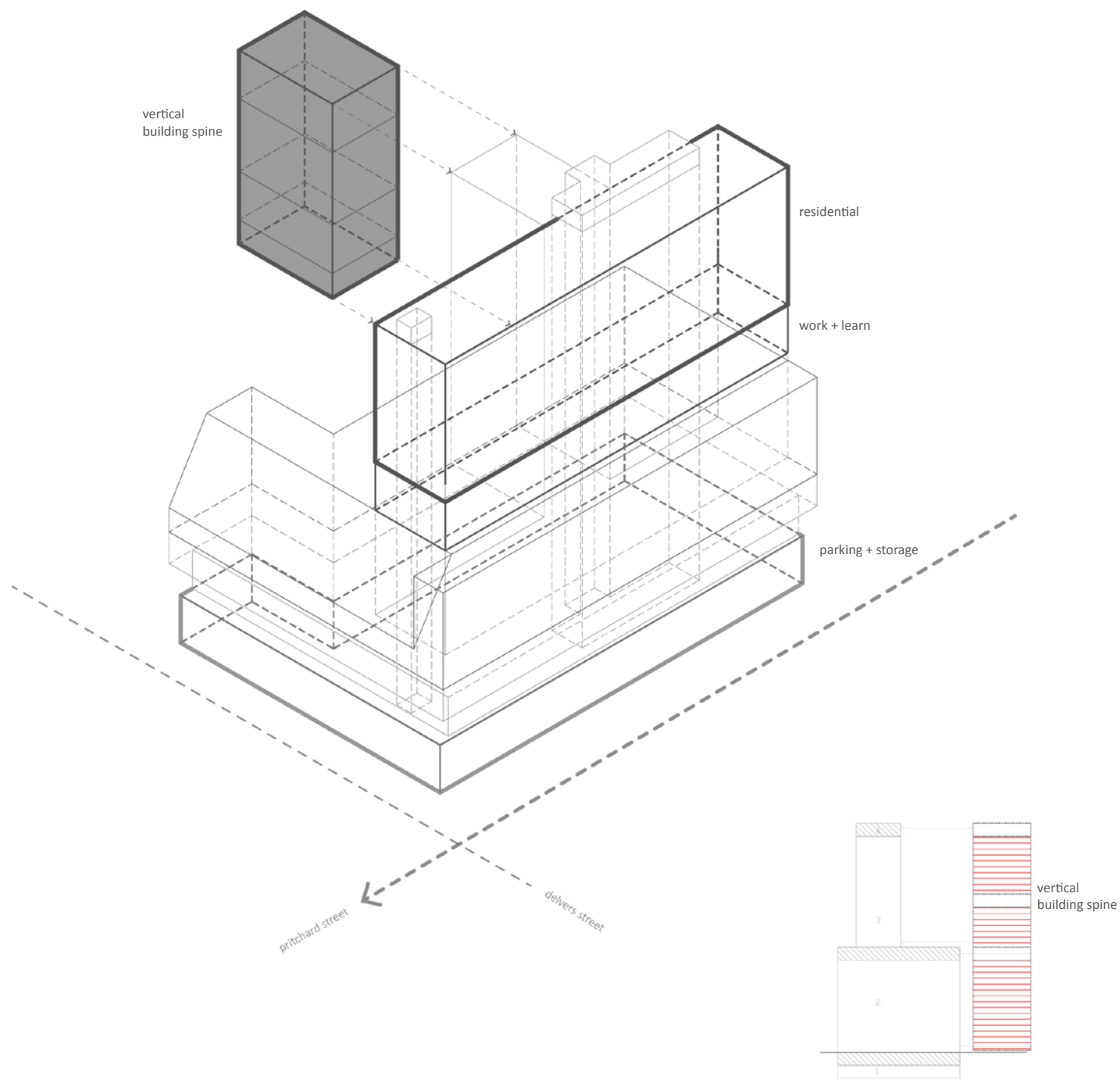
Figure



### **Taxonomy: elements of a building type in transition**

#### *redistributing bulk*

While the original office building typology seems to hold an abundance of space within its existing mass, the bulk of this space is in the 'wrong' place and has the 'wrong' profile, to meet the new programmatic demands. The same is true for the abundance of space around its tower profile, therefore the bulk is redistributed to above the existing podium level and covers 100% of the existing building footprint. This creates the required amount of space in the 'right' area of the building and extends the capacity of each of the existing floor plates. Furthermore, the new bulk effectively extends the capacity of the activity generated by the retail uses located on the ground plane in the vertical dimension to a maximum height of six floors as defined by the maximum number of floors that a shopper would walk up.



Figure

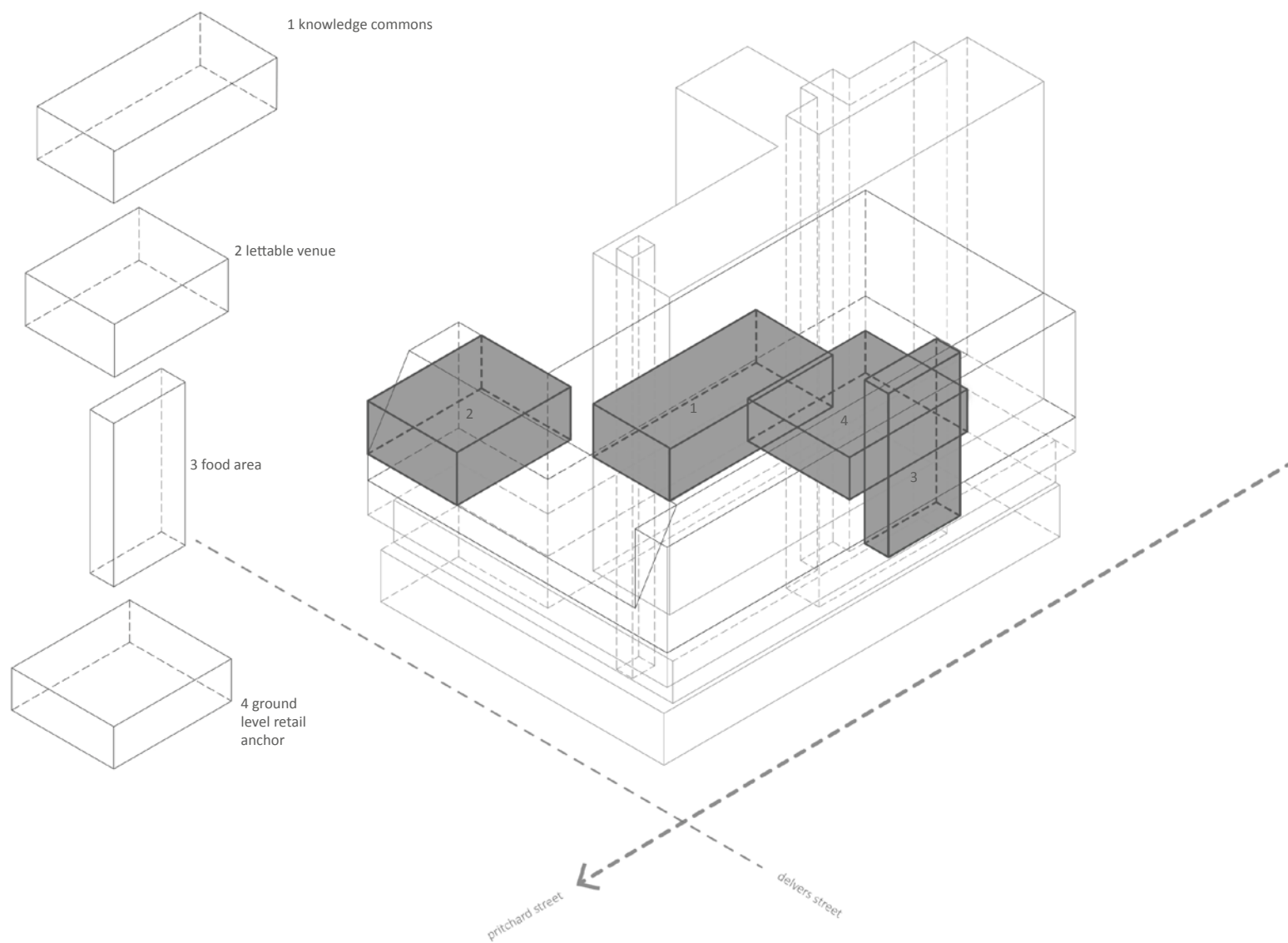
### *Layering of core uses in section*

The primary uses of the building is stacked in three zones, a public retail zone, a private residential zone and a common amenity zone between the two. Semi-public and semi-private uses are inserted into the existing spine of the building to support the private uses of the main part of the existing floor plate. Mixing public and private in this way is at odds with the hallmark separation of public and private, inside and outside relationship set out by modernist planning.

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With the bulk now correctly redistributed the broad category appropriate uses identified in the urban analysis can be overlaid onto the section of the existing building. These uses fill the bulk of the newly created and the existing space to meet the fundamental use demands of shopping, living and to a lesser degree working of the changing city. With the majority of the financial resources and focus now placed on the valuable newly added podium mass, the remainder of the existing building is subject to a process of reconfiguring the existing floor plates which is a simple process of space planning and synthesising the different space requirements into a coherent, functioning system that allows for change.



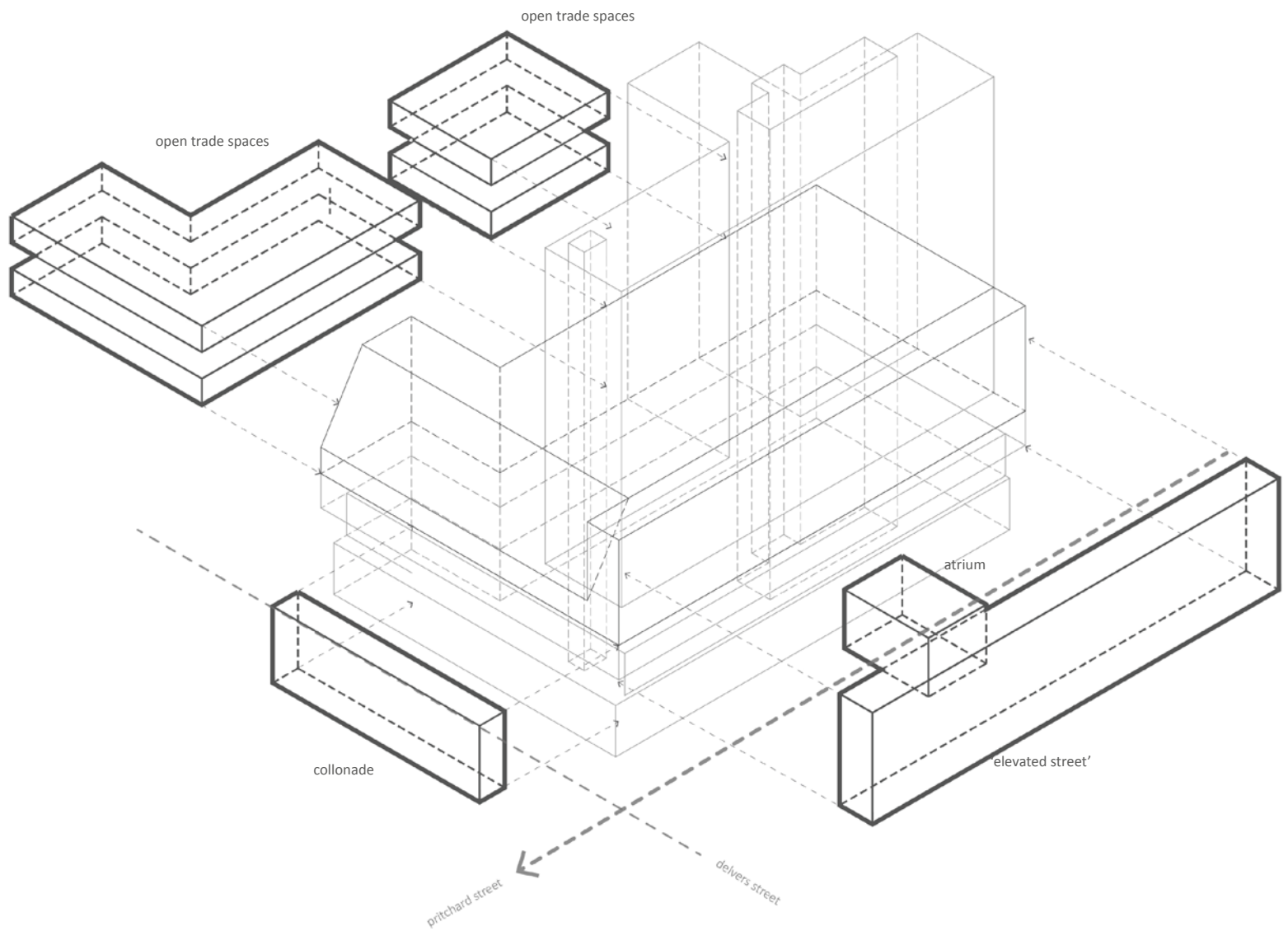


Figure

### *Inserting intensive multiple uses*

Anchor uses, in the form of essential resources, are inserted into the existing building form in an effort to provide a layer of structure to the building's uses. In addition to this, the anchors draw users of the building up vertically to maximise activity on as many floors as possible. The principle is based on the existing urban structure where very specific urban anchors allow for generic space to be in-filled with a variety of uses. These anchor uses do not only provide much needed resources to occupants of the building, but also to those who occupy the downtown Johannesburg area. In this way the project works at two scales where it creates a city in a building and a building that plays an active part of the city.

Furthermore, the organisation of these anchor uses creates a dynamic environment of intensive multiple uses that challenges the conventional model and arrangement of mixed use buildings.



Figure

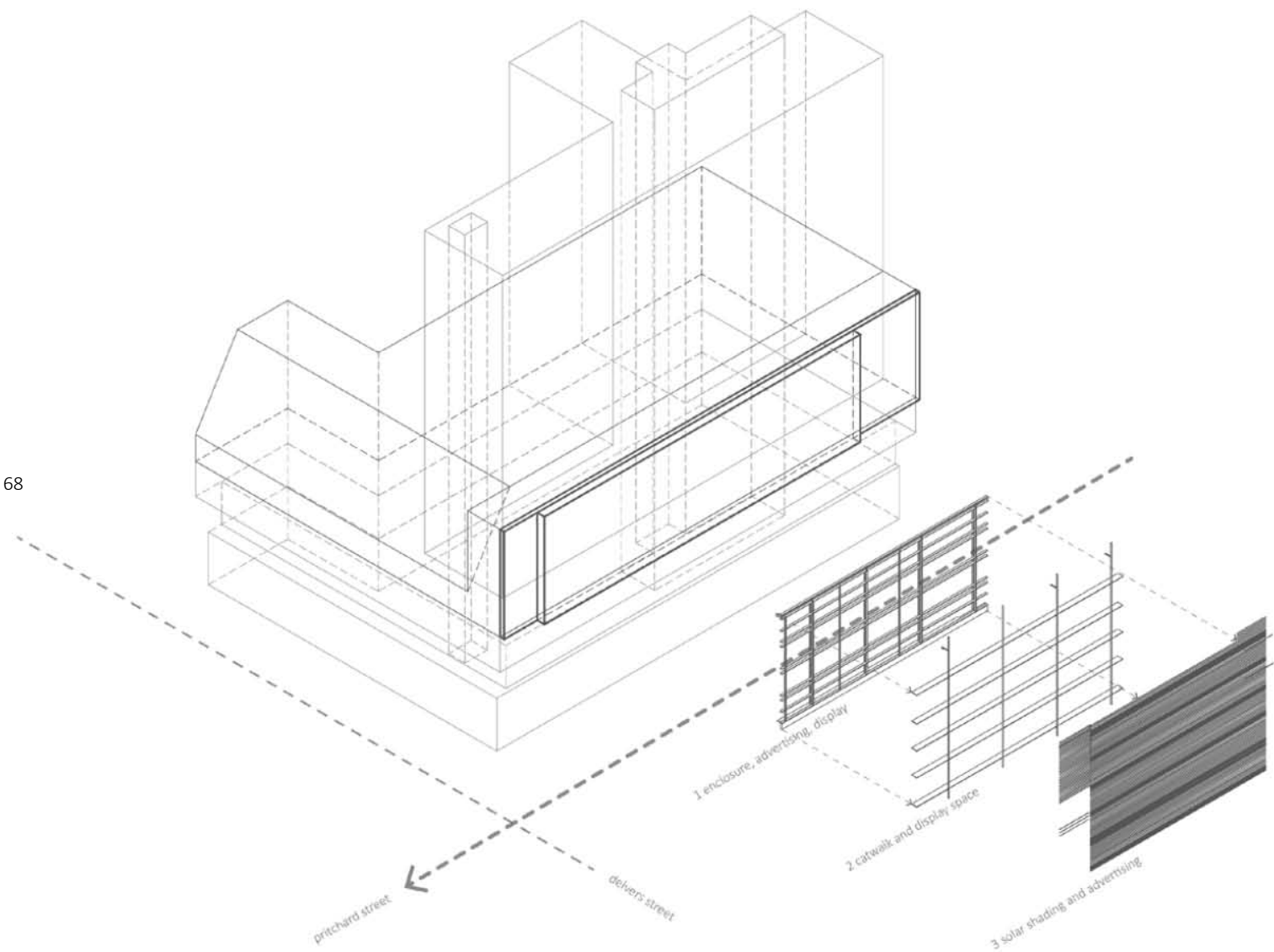
*Creating a vertical public mixing realm and Extending four existing floor plates*

Creating public space is a vital element to any successful city, therefore to continue the metaphor of creating a city in the building, the new and the existing floor plates are subjected to a strategy of voiding. Four voids are cut into these floor plates to create public mixing zones that offer the potential for less traditional structuring of uses. On the north of the building, above the existing street, an elevated street is created to accommodate shopping activity and vertical circulation that opens up directly into a second void cut into the existing floor plates. To the south, every second existing floor plate is extended and mezzanine levels inserted into the voids to create open trade areas onto which the formal uses open up.

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The strategy of voiding solves the problem of getting natural daylight deep into the building's new footprint as light is allowed to flood the new space from the north and the south. Lastly, this strategy also increases frontage for retail space and therefore maximises the density of retail activity per floor, making it a viable opportunity and creates streets that connect the public squares inside of the building. These two types of public space create a horizontal and vertical public realm inside of the building's envelope where at the scale of the building the corridor is the street and the square is the room.

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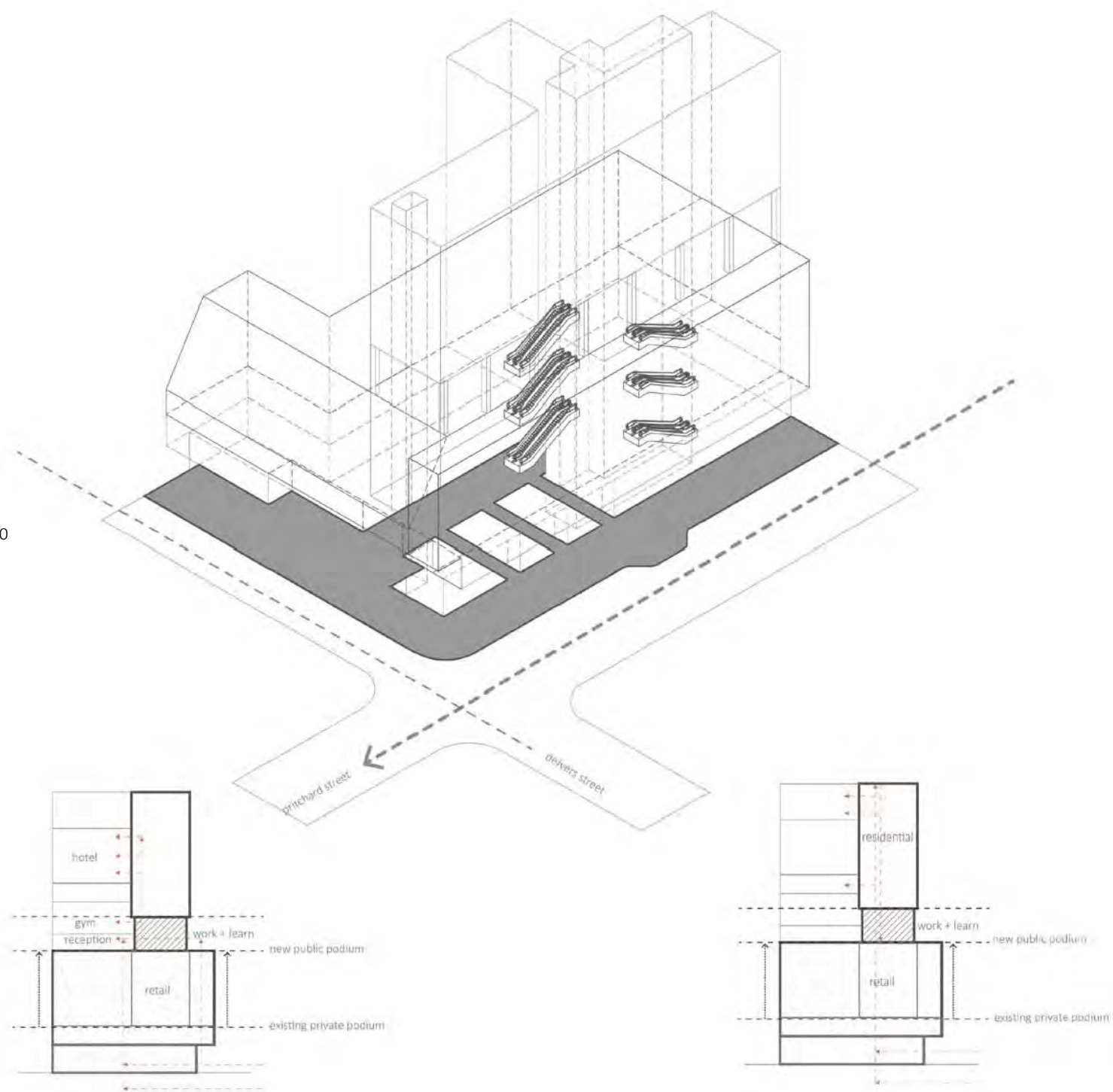
Figure

*a layered functioning skin*

A skin that is comprised of several layers including program, structure, advertising and environmental control wraps around the building to enclose the newly created voids and to contain the inserted anchor uses. The layering of the building's skin offers multiple solutions and serves several purposes in a building that needs to change to meet new demands and seemingly will evolve in time. As Stuart Brand frames thinking about built structures through a hierarchy of layers with varying lifespans, the elements of the functioning skin is separated according to their degree of impermanence and likelihood of change according to changing needs. This strategy allows any part of the skin to be removed and replaced, but its structure.

The idea that the internal uses of the building can be displayed on the outside of the building is explored through the concept of transparency. The strategy of layering allows this concept to be explored through the ideal number of layers, the visibility through all of the layers and the distance of the object from the core. The need for transparency allows for 'free' advertising for the retail space, permits and controls natural light, but more importantly directly and visually enhances the relationship between the city and the building.

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Figure

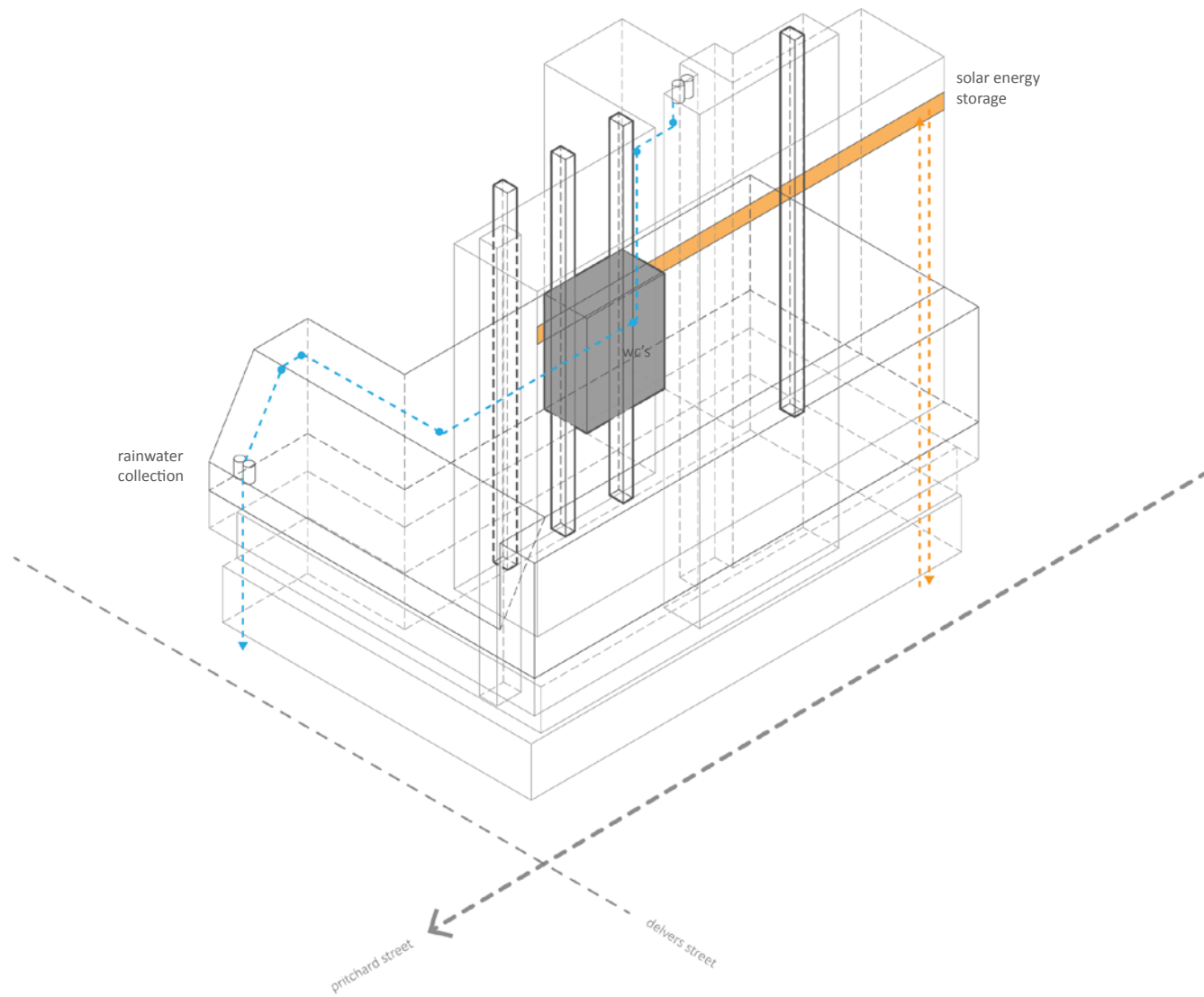
*Movement and street access and Public/ private vertical negotiating*

Accessing the building from the street level is maximised by opening up the ground floor level through multiple 'streets' that penetrate the depth of the ground floor and lead to vertical circulation that acts as a vertical street to connect the separate floor plates. These new 'streets' of the open ground plane stimulates the creation of a new pedestrian oriented street in Delvers Street that connects the retail and transport anchors in the north with those retail and transport anchors in the south along the proposed building site while tying into the existing pedestrian street network. Delvers pedestrian oriented street runs parallel with the newly inserted retail arcades of Small Street to create a network of public space that ties in seamlessly with the proposition of this transitioning building typology.

In addition to this, the new public podium level that has been moved up four floors acts as the second ground plane that serves to distribute and filter users of the building's private uses. On this public level, amenities draw the broader public and users of the building up from the ground floor and distribute them to the semi-public building spine while residents of the building down from their residential units to create a large mixing and interacting zone. Private uses, such as the residential units can be accessed via access control points on the ground floor and from both the basement levels.

Vertical circulation through the building is achieved by assessing the existing vertical circulation, splitting it between the new uses and adding to it where shortages occur. Therefore, two of the four elevators in the existing services core are used for residential purposes and the other two are used to access the shopping floors and the work level. Additional escalators connect the ground plane with the podium level, linking the horizontal corridors or 'streets' at each floor. The existing central horizontal corridor is eliminated by moving it to the perimeter of each floor plate to give it access to light, ventilation and to visually connect it with the city. Public/ private relationship modernist



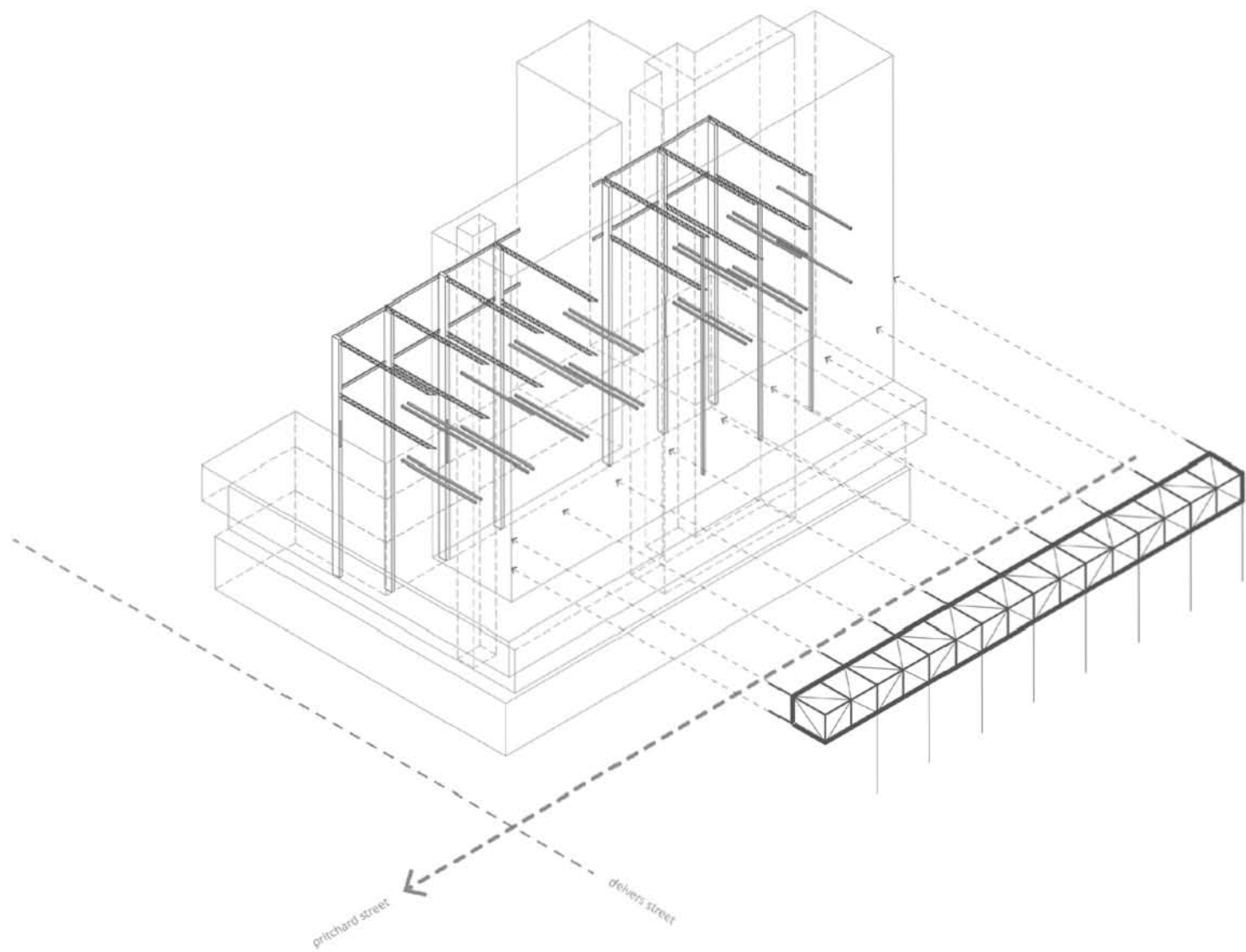


Figure

*Clip on new services, generating energy and moving off-the-grid*

While the existing available space may be able to support the new numbers but the quantity of services, increased demand and lack of supply for energy, water, waste management cannot support it. Therefore, adding new uses and increasing the capacity of an existing building inevitably means that there will be a shortage in supply of services. The strategy for adding new vertical services is to slip it onto the outside of the building so as to eliminate the need for cutting into the existing reinforced concrete floor plates and around the 650mm x 450mm reinforced concrete beams. These services ducts also have the potential to act as columns for adding new loads when extending the existing floor plates. Horizontal services of the new mass are run along the perimeter of the footprint of the building inset from the column line.

The notion of a building that is a resource to the city is expanded to a capacity where the building becomes self-sufficient by generating off-the-grid energy and returns surplus energy back to the grid. This is achieved through means of solar panels to generate electricity for a 'cash strapped' user and in a time where electricity is a scarce resource. Rain water is another resource that is captured and used to service these transitioning building typologies.



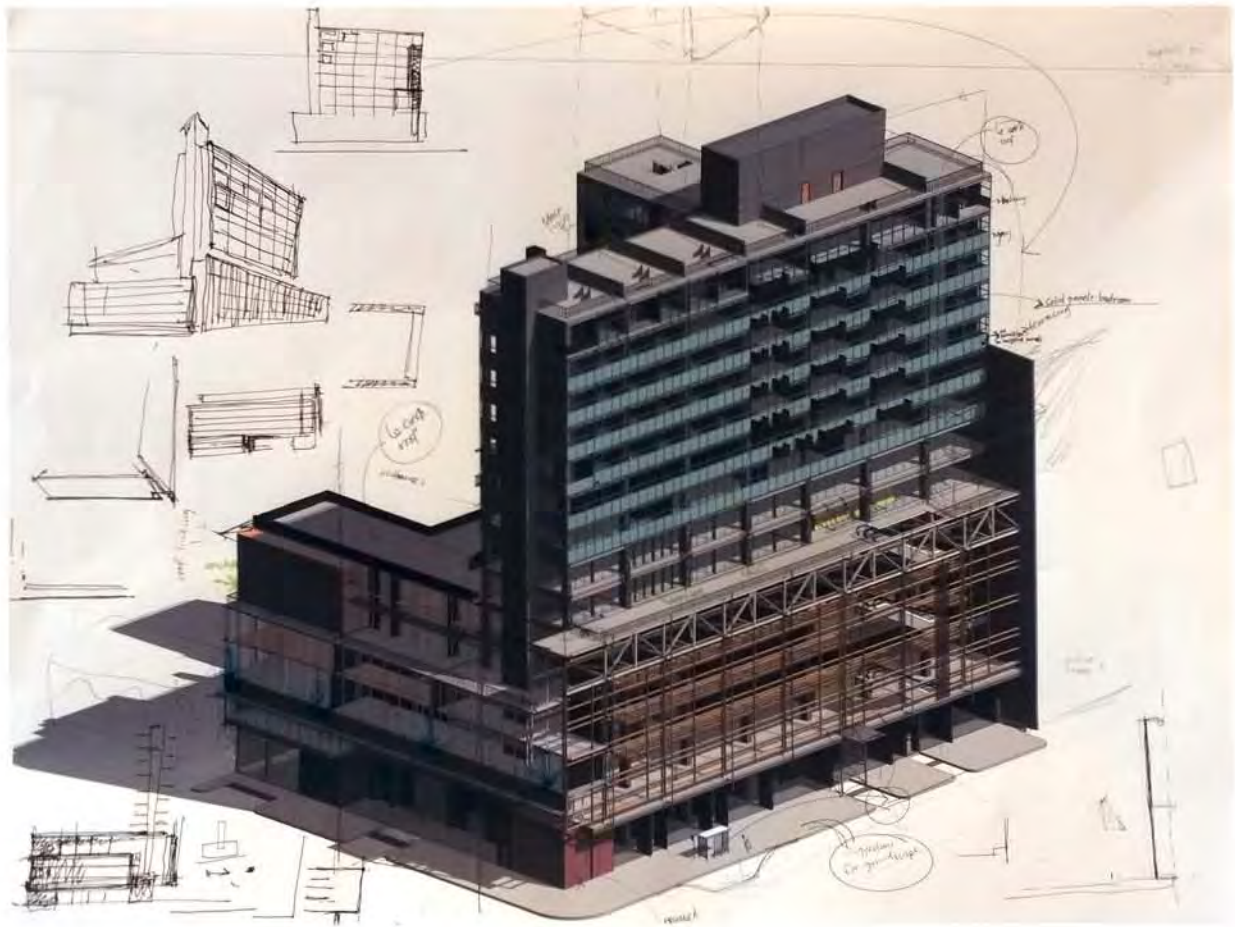
Figure

### *Structure, materiality*

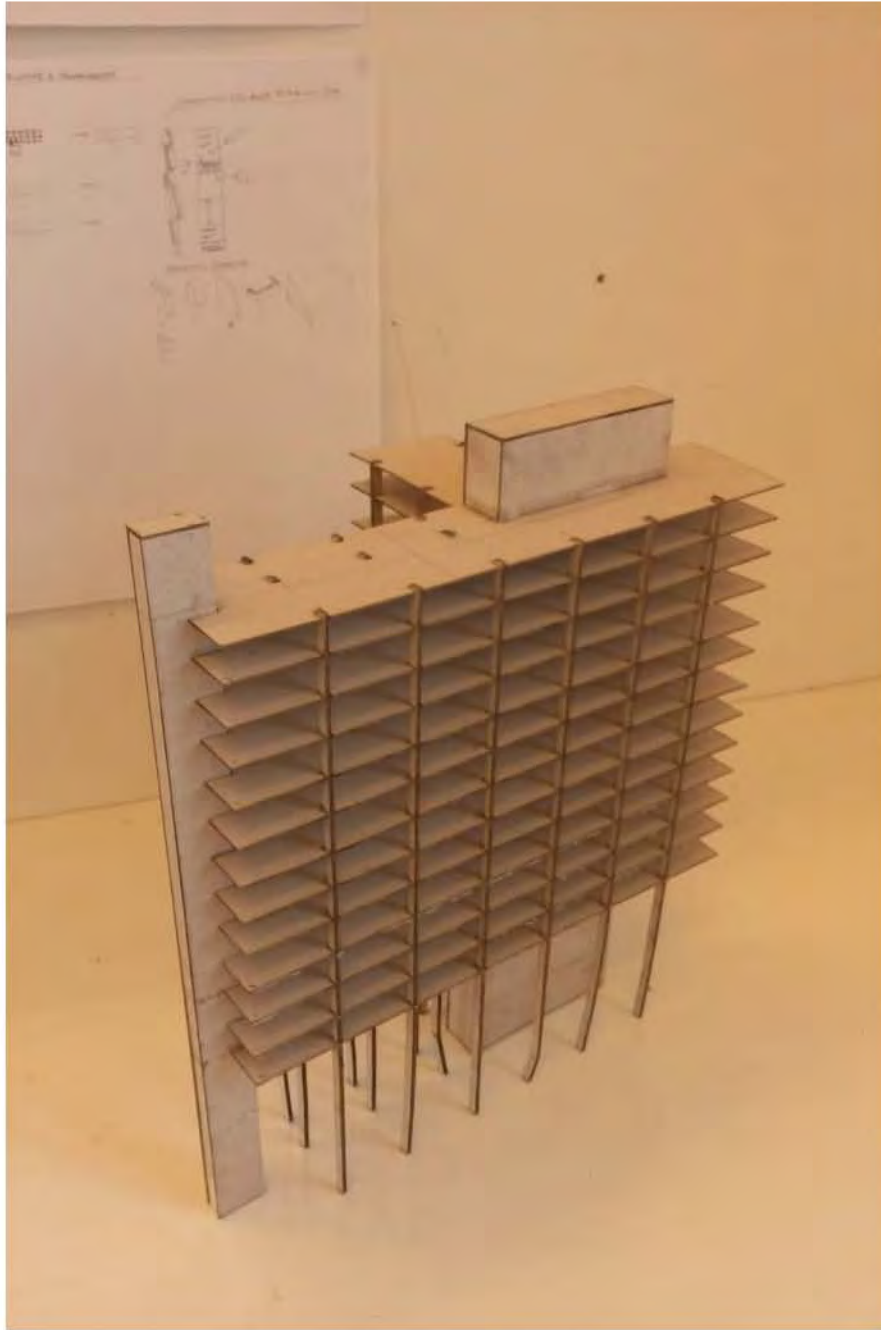
The overall attitude take to developing structure and materiality for the addition of the new mass, is that achieve an architectural lightness q that integrates itself with the existing building form, but makes legible the large, heavy elements of the existing building. This contrast between heavy and light puts into perspective the anti-urban capacity of the original building typology and in so doing highlights the capacity of the transition in typology for aiding and regenerating the urban environment.

The structure of the new mass consists repetitive structural steel bays that receive a layering of cladding systems with the objective of achieving a transparency through the building. This fine, light quality has to receive a robust layer of 'protection' from the effects of intense everyday use which seems at odds with its intention, but it is these sorts of disjunctions that define a complex changing city that no longer caters to the needs of a singular, mono-functional demand.

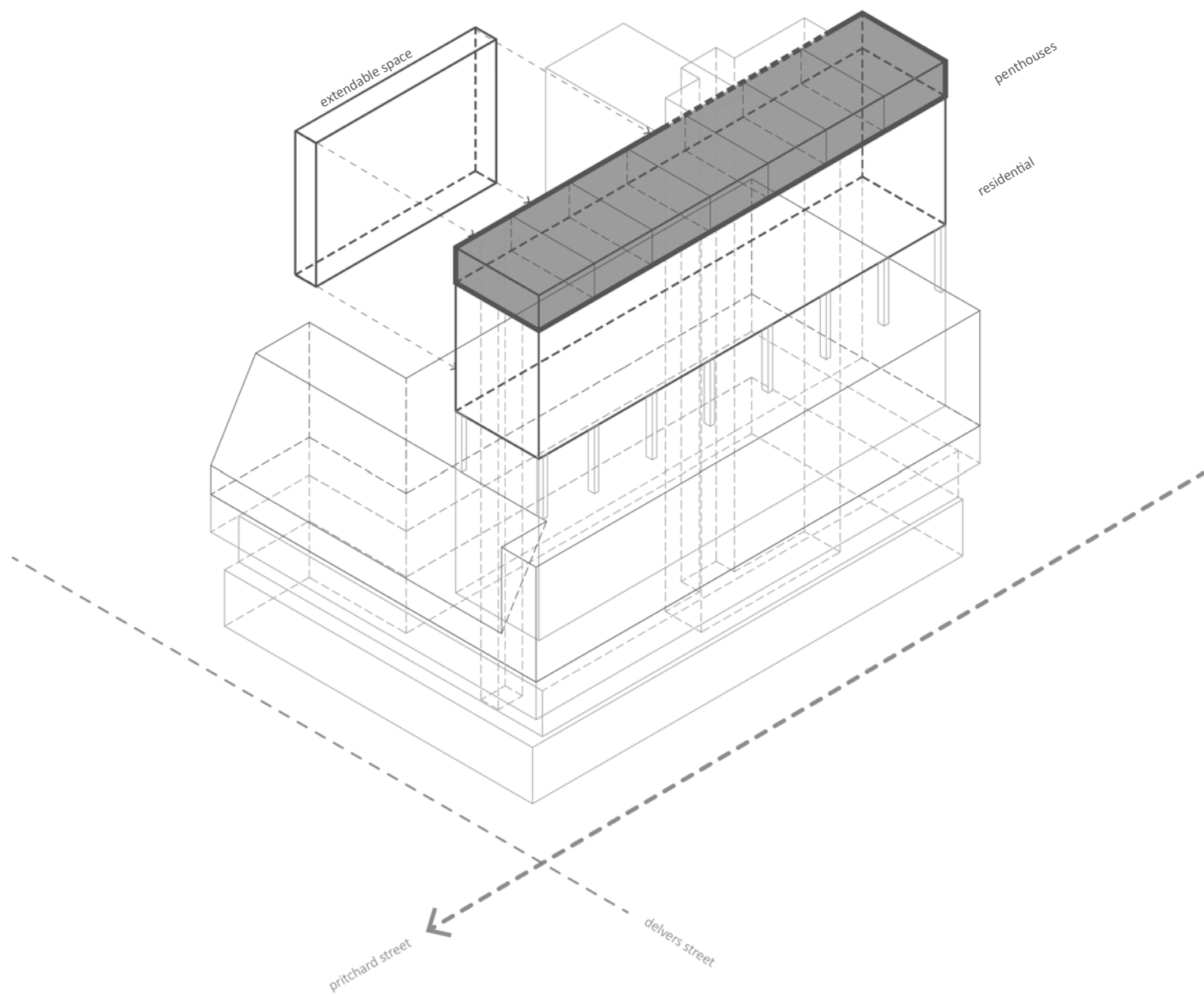
The structural steel bays and the precast concrete floor slabs achieve a speed of construction that is essential in dense urban conditions. Effectively the project involves the addition of two new composite floors, in three separate sections, at the fourth and sixth floors and two mezzanine floors that are suspended via steel cables from the steel trusses of the new floors above.



Figure



Figure



Figure

#### *Ownership model*

The ownership model moves from sectional title to an entire building that is managed by a single management company that is responsible from effective operation and maintenance of the building.

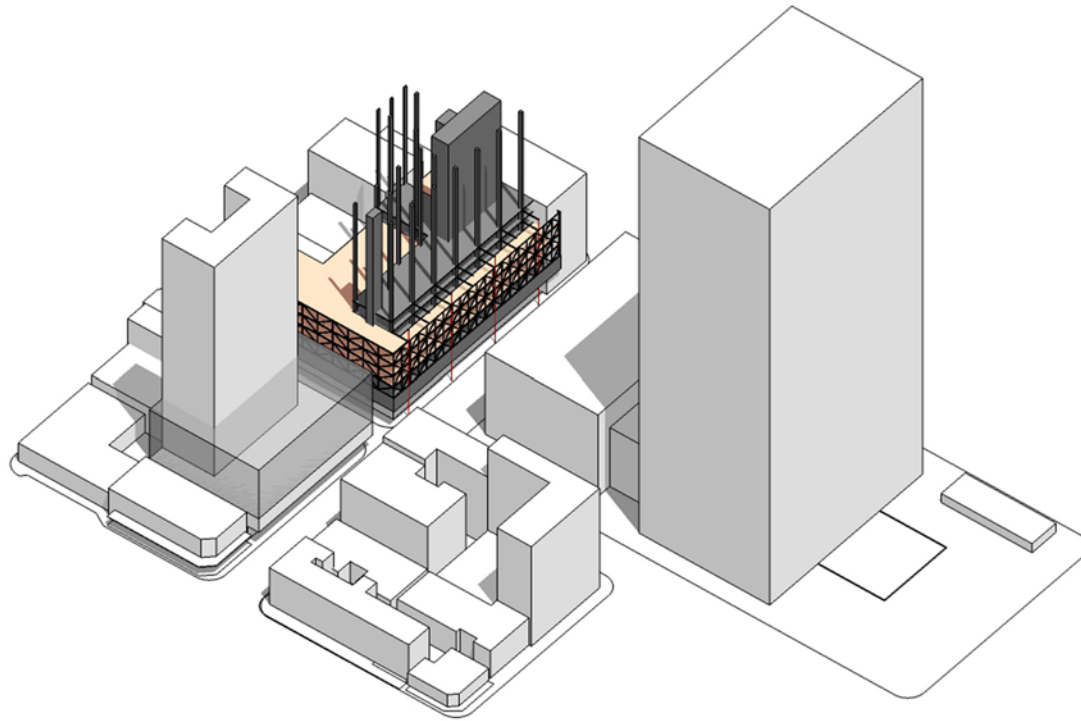
The new addition may be financed separately from the existing reconfiguration activity, while the penthouse apartments cross-subsidise the development of the lower-income apartment units. This allows for a public/ private partnership to be engaged in the development of a project that serves the need of the city as much as it serves the needs of its residents.





#### *A network of resource buildings*

Once all forms of resources- in existing space, use and off-the-grid- are accounted for, the transitioned building forms part of multiple other building of the same typology to create a network of resources that is a disaggregation of the single, large scale, ripple effect projects that aim for urban regeneration. Instead this tactical approach combines small scale transitions and large scale impact to create a resourceful urbanism that has a collective effort to regenerate downtown Johannesburg from the bottom up. In this way, the network of dispersed buildings become the resource urban anchors that support life in an environment which was not designed to be lived in. A network that is flexible enough to accommodate the future.



Figure

**AFTER:**

*The changing city: resourceful urbanism to a port of entry and exit*

Reconsiders the modernist city and suggests a paradigm for its future.

Will continue to change because for many foreign Africans in the inner city, Johannesburg is neither the preferred nor the final destination, especially at present. Although, most immigrants dream of a quick score that would enable them to return home with significantly enhanced prestige and purchasing power, this rarely happens. What happens when these foreign migrants return home? Do others replace them? Is the future of downtown Johannesburg a pit stop, a port of entry and exit to the continents people to access capital and then move on to bigger and better things? (AMS people as infrastructure pg422,423)

## CONCLUSION

At the beginning of the year I set out with a broad interest in Johannesburg and an aim to better understand the changing nature of this city. I wanted to go to the very beginning and grasp its logics and development history- where did it come from and what makes it tick.

The project is an attempt at simultaneously engaging in, and negotiating between the pragmatic ideals of city-making, and the poetic nature of a timeous and precious patch-work of urban fabric. By utilising the existing space as a resource, the project adds a network of resources to the city and contributes new urban amenities to the city in support of its new permanent residents. It explores the relationship between city and building and city and inhabitant. Lastly, its physical resolution represents and contributes to the regeneration of the city's urban fabric and the life forms that make it their home.

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Only through an intense fascination of Johannesburg, a desire to understand its logics, its demands and its abilities, can one begin to understand how complex and ever-changing the city is. The transition from mining camp, to high-modernist CBD, to accommodating people from the so-called margins builds up a rich layers of spatial structure to produce and urban experience that resonates across time.

This project is simply a moment in time in downtown Johannesburg's transition from work to live, and only one of many contributors to the city's regeneration efforts where strategic density, increased occupancy rates, intensive multiple use, and character come together to create an urban fabric.

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